Dissertation

Entitled

Understanding SHERQ Managerial perspectives of the risks and opportunities in ISO 14001:2015 implementation in Durban, KwaZulu-Natal

Submitted by

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I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

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I hereby place on record my sincere thanks to the almighty for granting me the ambition to pursue this opportunity. This study was undertaken during the peak of a global pandemic, the grace of God is truly appreciated for allowing this endeavour to progress.

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Summary

The International Organization for Standardization - ISO 14001 environmental standard addresses facets of environmental performance. The implementation of ISO 14001:2015 is aligned with various risks and opportunities, the identification and addressing of which is key in the successful implementation of the ISO 14001:2015 certification. The Durban region is a pollution 'hotspot' within KwaZulu-Natal. Assessment of the opportunities and risks of ISO 14001:2015 implementation within the region is key as it can potentially assist with proactive mitigation of risks and the effective utilization of opportunities.

The aim of the study is to understand SHERQ (Safety, Health, Environmental, Risk and Quality) managerial perspectives of opportunities and risks of ISO 14001:2015 implementation in Durban, KwaZulu-Natal. The following objectives were outlined: To identify ISO 14001 implementation opportunities and risks internationally and nationally by means of an extensive review of international as well as national literature sources, to generate an evaluation framework to assess SHERQ managerial perspectives of risks and opportunities of ISO 14001:2015 implementation within Durban and to analyse SHERQ managerial responses to the ISO 14001:2015 implementation risks and opportunities within the Durban region.

The methods included identifying primary opportunities and risks in ISO 14001:2015 from the literature review through an evaluation framework, thereafter, presenting these in questionnaires distributed among SHERQ managers in Durban via email and LinkedIn. Of 62 questionnaires distributed, 42 participants responded. The respondent's perspectives were assessed through SPSS identifying key risks and opportunities.

Objective 1 was achieved through the literature review in which ISO 14001 implementation risks and opportunities were identified. Objective 2 was achieved by generating the evaluation framework which assimilated implementation risks and opportunities. Objective 3 was achieved through the

analysis of the responses of respondents to ISO 14001:2015 implementation risks and opportunities.

Study results showed that, in line with international reports, 57.2% of all respondents agreed that the maintenance costs of compliance to the standard are high and 76.2% of respondents shared the perspective that company resources are better managed. Respondents were more agreeable to positive statements, indicating opportunities outweighing the risks. Furthermore, despite the risks, there are opportunities from an industry perspective such as increased investor inputs and increased top management involvement.

A follow up study is recommended in the Durban region addressing ISO 14001 implementation risks, opportunities, and their investment impacts in order to further hone in on the organizational implications of certification. From an academic standpoint, multiple studies have posited that ISO 14001:2015 implementation resulted in improved financial outcomes but are associated with high implementation costs and it is recommended that a critical cost versus profits analysis into ISO 14001:2015 implementation be undertaken in the Durban region.

Key words: International Organization for Standardization (ISO), SHERQ, Opportunities, Risks, ISO 14001:2015, Durban

Opsomming

Die Internasionale Organisasie vir Standaardisering se ISO 14001-omgewingstandaard spreek fasette van omgewingsprestasie aan. Die implementering van ISO 14001:2015 is gerig op verskeie risiko's en geleenthede, en die identifisering en aanspreek hiervan staan sentraal tot die suksesvolle implementering van die ISO 14001:2015 - sertifisering. Die Durban-streek is 'n besoedlingsbrandpunt in KwaZulu-Natal. Evaluering van die geleenthede en risiko's van die implementering van ISO 14001:2015 binne die streek is van kardinale belang, aangesien dit moontlik kan help met die proaktiewe vermindering van risiko's en die effektiewe benutting van geleenthede.

Die doel van die studie is om SHERQ-bestuursperspektiewe van geleenthede en risiko's van ISO 14001:2015-implementering in Durban, KwaZulu-Natal, te begryp. Die volgende doelwitte is uiteengesit: Om ISO 14001-implementeringsgeleenthede en risiko's internasionaal en nasionaal te identifiseer deur middel van 'n uitgebreide oorsig van internasionale sowel as nasionale literatuurbronne; om 'n evalueringsraamwerk te genereer om SHERQ-bestuursperspektiewe van geleenthede en risiko's van die implementering van ISO 14001:2015 te evalueer, en om SHERQ-bestuursreaksies op die ISO 14001:2015-implementeringsrisiko's en -geleenthede te ontleed.

Die metodes het ingesluit die identifisering van primêre geleenthede en risiko's in ISO 14001:2015 vanuit die literatuurbeoordeling deur middel van 'n evalueringsraamwerk, waarna dit in vraelyste wat via e-pos en LinkedIn onder SHERQ-bestuurders in Durban versprei is, uiteengesit is. Van die 62 vraelyste wat versprei is, het 42 deelnemers geantwoord. Die perspektiewe van die respondente is beoordeel deur middel van SPSS se identifisering van die belangrikste risiko's en geleenthede.

Doelwit 1 is bereik deur middel van die literatuuroorsig waarin ISO 14001-implementeringsrisiko's en -geleenthede geïdentifiseer is. Doelwit 2 is bereik deur die evalueringsraamwerk te genereer wat implementeringsrisiko's en -geleenthede geassimileer het. Doelwit 3 is bereik deur die antwoorde van

respondente op ISO 14001:2015 implementeringsrisiko's en -geleenthede te ontleed.

Studieresultate het getoon dat, in ooreenstemming met internasionale verslae, 57,2% van alle respondente dit eens was dat die onderhoudskoste van die nakoming van die standaard hoog is en dat 76,2% van die respondente die perspektief gedeel het dat bronne van die maatskappy beter bestuur word. Respondente het meer met positiewe stellings saamgestem, wat daarop dui dat geleenthede swaarder weeg as die risiko's. Ten spyte van die risiko's, is daar ook vanuit 'n bedryfsperspektief geleenthede, soos verhoogde beleggersinsette en verbeterde hulpbronbestuur.

'n Opvolgstudie word aanbeveel om ISO 14001-implementeringsrisiko's en geleenthede en die beleggingsimpak daarvan aan te spreek. Vanuit 'n akademiese oogpunt het veelvuldige studies aangevoer dat die implementering van ISO 14001:2015 verbeterde finansiële uitkomste tot gevolg het, maar dat dit met hoë implementeringskoste gepaard gaan, en dit word aanbeveel dat 'n kritieke koste-versus-wins-analise in die implementering van ISO 14001:2015 in die Durban-streek onderneem word.

Sleutelwoorde: Internasionale Organisasie vir Standardisering (ISO), SHERQ, geleenthede, risiko's, ISO 14001:2015, Durban

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List of Acronyms

EMS:	Environmental Management System
IAP:	Interested and affected parties
ISO:	International Organisation for Standardization
PDCA:	Plan, Do, Check, Act
SA:	South Africa
SADCEA:	South Durban Community Environmental Alliance
LCA:	Life Cycle Assessment
SD:	Standard Deviation
SHERQ:	Safety, Health, Environmental, Risk and Quality
IMS:	Integrated Management System
Fe:	Fishers Exact
P:	Probability
SD:	Standard Deviation

Chapter 1: Introduction

1.1 Background of ISO 14001

Many contemporary living standards appear unsustainable with regards to the development of future generations (Jensen & Bondesson, 2016) particularly as increasing human populations exert pressure on natural systems (Maliwatu, 2018). In addressing this, ISO 14001 focusses on environmental protection as a matter of concern for most countries as many current global development patterns are unsustainable from a long-term perspective. The United Nations Conference based on the Human Environment held in Stockholm in 1972 provided an initial stock take of the worldwide impacts of humans on the environment and offered broad environmental objectives and goals regarding environmental preservation (United Nations Environment Programme, 1992). Following the Stockholm conference, international law has kept pace with increasing worldwide recognition and concerns relating to the environment (United Nations Environment Programme, 1992).

Over the past few decades, mechanisms such as Environmental Management Systems (EMSs) were developed to improve environmental performance and green management (Lee, Noh, Choi & Rha, 2017) as efforts by governments as well as the private sector to increase organizational efficiency while implementing environmental regulation compliance (Environmental Protection Agency, 2017). Arts and Faith-Ell (2012) indicated that EMSs are practical environmental instruments that include green procurement to support environmental governance. Within the dynamically varying environmental legislative as well as regulatory respect in South Africa, it is vital that substantial capacity development inputs within organizations occurs (Sennoga & Ahmed, 2020).

Organizations wishing to achieve economic and environmental targets introduce EMSs into their operational procedures. As such, EMSs such as those that are ISO 14001 certified, are currently the most popular environmental standard globally (Lee et al., 2017). Aba and Badar (2015) described the International Organization of Standardization (ISO) as a relationship among

organizations which were non-governmental; initiated in 1947 within Geneva, Switzerland and that ISO 14001:2015 serves as a basis toward the uniformed standards of service design, product development and processing among companies.

Nel and Alberts (2016) highlight that the ISO 14001 environmental standard which was initiated in 1996 is a component of the suite of environmental management tools which outline the requirements of an EMS. The ISO 14001 standard facilitates facets of environmental performance and it is a dynamic standard for all organizations irrespective of industry - revisions were noted in 2004 and 2015 (Maliwatu, 2018). Milazzo, Sgandurra, Matarazzo and Bertino (2017) agreed that environmental consideration was not a limitation but rather was an opportunity providing competitive advantages particularly as the new ISO 14001:2015 environmental standard revision was created to fit all firms.

The implementation of ISO certifications has grown at a fast pace within developing countries in Africa including South Africa such that ISO 14001 certifications increased by 19% between 2014 and 2015 (Tene, Yuriev, & Boiral, 2018). However, the globally uneven distribution of ISO certificates raises questions about the applicability of the standard within certain organizations in certain regions (Tene et al., 2018).

Aravind and Christmann (2011) specified that symbolic implementation of ISO 14001 refers to the certification of an organization with low levels of the standards implementation suggesting that certified organizations might not continuously practice all the success determinants of ISO 14001. Chiarini (2019) conducted a quantitative study utilizing questionnaires (as will this study) to assess ISO 14001 implementation success determinants and found that three out of the six features that impact successful ISO 14001 adoption were (1) environmental technical skill development, (2) employee involvement and (3) top management commitment. This suggests the critical importance of top managerial commitment as one of the vital success determinants of an ISO 14001 certified EMS. Despite environmental benefits such as emission control being identified as one of the benefits of ISO 14001 implementation, the risks

as well as the administrative costs of implementation are largely inconsistent thus requiring further investigation (Ikram, Mahmoudi, Shah, & Mohsin, 2019). Working in or inhabiting unhealthy environments has contributed to approximately 12.6 million fatalities globally and to 2.2 million fatalities within the African continent (Anderson, 2017). Durban, situated in KwaZulu-Natal, is a city developing at a fast pace, that necessitates efficient transport and infrastructure with associated environmental concerns (Anderson, 2017). This underscores the need for research to streamline organizational EMSs within the region. This study will aim to examine SHERQ managerial perspectives of the opportunities and risks associated with ISO 14001:2015 implementation within the Durban region.

1.2 Rationale and problem statement

A significant increase in the quantity of organizations which achieved ISO 14001 certifications globally has been recorded recently, the aforesaid increase suggests that firms are willing to allocate resources and time to attain an ISO 14001 certification (Chowdhury, Prajogo, & Jayaram, 2017).

These authors state that despite a corporation's theoretical environmental commitment, regardless of a firm's certification status, these factors do not ensure the implementation of pivotal facets of ISO 14001:2015. In support of this, research has indicated that despite auditing conducted by third parties, certain organizations frequently adopt the requirements of environmental policies and standards short of continually maintaining standard requirements nor fully incorporating prescribed standard practices (Aravind & Christmann, 2011, Latridis & Kesidou, 2016). This is particularly important when considering safety, health, environmental, risk and quality (SHERQ) factors that form an integral part of urbanization and the links between urban residential communities and nearby industries. SHERQ encompasses tangible as well as intangible safety, health, environmental, risk and quality management facets to ensure occupational safety of employees as well as their occupational wellbeing while safeguarding the environment and society (DPSA, 2012). SHERQ was generated in response to the Basic Conditions of Employment Act (No. 75 of 1997), Environmental Management Act 1998, the Occupational

Health and Safety Act (No 85 of 1993), and Employment Equity Act (DPSA, 2012). Furthermore, it considers ISO standards inclusive of ISO 14001. SHERQ systems aim to generate significant additions to healthy work conditions for public servants. The key objective of SHERQ as a relationship between community, employer and employee, is to generate quality jobs and production ensuring practical environmental quality practice, not simply jobs and production in high quantity (DPSA, 2012).

According to Anderson (2017), South Durban includes densely populated residential settlements as well as highly industrialised regions which have significantly high air pollution levels. The aforesaid renders Durban a model location to examine top managerial perspectives as to the implementation of EMSs in order to ascertain key factors which require further research and organizational operational action for the purpose of environmental protection particularly within the Durban region so as to understand their stance on ISO 14001:2015 implementation at present as such a study has not been currently undertaken from an exclusively SHERQ managerial perspective, which provides a relatively novel viewpoint which may form the foundation for further continuous improvement efforts.

The ISO 14001:2015 standard adoption is inclusive of numerous opportunities and risks which stem from ISO 14001:2015 implementation and it is essential to identify and outline these as ISO 14001:2015 implementation is key in the control and potential mitigation of operational environmental impacts (ISO, 2015). In addition, it is important to determine how top management within organizations respond to the implementation and to variations in the standard regarding continuous improvement in leadership, resource and waste management (Aguiari et al., 2016).

Despite certain organizations within the Durban region having obtained ISO 14001:2015 certification, environmental impacts emanating from various organizations persist so much so that the Durban South basin is described as a South African pollution hot spot by The South Durban Community Environmental Alliance (Bhengu, 2019). The inadequacy of knowledge attributable to a lack of research pertaining to ISO 14001:2015 risks and opportunities within a developing country poses a problem to organizations with

regards to their potential to reduce environmental degradation and advance performance environmentally through ISO 14001:2015. Integral role players within this study are managerial staff who can successfully implement ISO 14001:2015 – these individuals are situated within the arena of safety, health, environmental, risk and quality control (SHERQ) (Chiarini, 2019). Thus, the aforementioned target audience has been selected as the primary respondent participant group for this study. As mentioned above, primary participants in this research are SHERQ managerial staff, who are vital in the successful implementation of ISO 14001:2015; these members of management are positioned in the sectors of safety, health, environmental, risk and quality control, thus the assimilation of their perspectives pertaining to ISO 14001:2015 implementation is key in the identification of its primary risks and opportunities as prior suggested (Chiarini, 2019). Risks and opportunities are additionally addressed within ISO 14001:2015, risks are defined as possible unfavourable outcomes such as threats whereas opportunities are characterized as potential beneficial effects (Biswas, 2019).

At grass roots level employees, such as SHERQ management play a pivotal part within gauging of ISO 14001:2015 implementation in addition to possible adoption concerns pertaining to successful implementation of EMSs (Boiral et al., 2018).

Hence, the above argument leads to the study research question: What are SHERQ managerial perspectives as to the risks and opportunities in the implementation of ISO 14001:2015 in Durban, KwaZulu-Natal?

To answer this research question, the following research aim, and objectives have been set:

1.3 Research aim and objectives

The aim of the study is to understand SHERQ managerial perspectives of the risks and opportunities in ISO 14001:2015 implementation in Durban, KwaZulu-Natal.

To achieve this, the subsequent objectives were outlined:

1. To identify ISO 14001 implementation opportunities and risks internationally and nationally by means of an extensive review of international as well as national literature sources.

2. To generate an evaluation framework to assess SHERQ managerial perspectives of risks and opportunities of ISO 14001:2015 implementation within Durban.

3. To analyse SHERQ managerial responses to the ISO 14001:2015 implementation risks and opportunities within the Durban region.

1.4 Delineation of the scope of the study

Research data collection pertaining to this study is conducted primarily between June and October 2020. This study does not target specific organizations, rather the focal point of research participant inclusion is candidate occupational positions within the Durban region, i.e., SHERQ managers within the Durban region. Limitations of this study extend to time constraints due to the duration of the study in conjunction with the time and research participants accessibility constraints posed by the COVID-19 pandemic. Assumptions within this research are inclusive of the independent perspectives of respondents and the random sampling of data.

1.5 Outline of the study

Chapter 1 demonstrates the primary background of the research encompassing the pertinence in ISO 14001:2015 implementation, in addition to the research question, the aim and objectives of the study undertaken.

Chapter 2 presents a literature review assessing both national and international research pertaining to ISO 14001 to achieve a contextual comprehension regarding the research topic.

Chapter 3 encompasses the methodology which will be utilized for the research that will be undertaken thereby outlining the premise utilized for surveys compilation, distribution and collection. Furthermore, the study limitations are presented in Chapter 3.

Chapter 4 is comprised of the results and discussion section of the research in which the data assimilated from the questionnaires are assessed according to each question posed to survey participants.

Chapter 5 is the concluding chapter in the study which outlines the meeting of the studies objectives through the identification of SHERQ managerial perspectives of ISO 14001:2015 risks and opportunities. Taking the aforementioned into consideration, key recommendations pertaining to ISO 14001:2015 implementation in the Durban region will be generated and presented.

This dissertation outline and sequence are illustrated below:

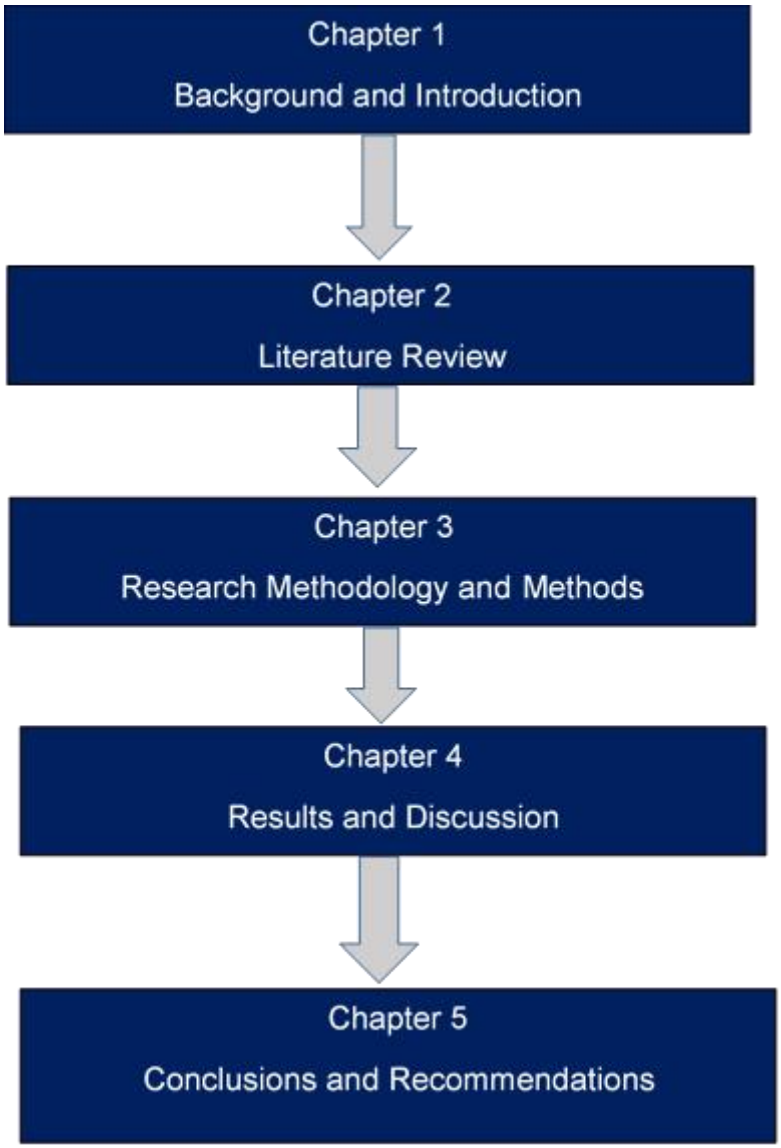

Figure 1.1: Outline and sequence of the dissertation

Chapter 2: Literature Review

The aim of the review of pertinent literature was to achieve the first objective of this research by identifying ISO 14001 implementation opportunities and risks internationally and nationally by means of an extensive review of international as well as national literature sources. This chapter consists of a background to environmental management followed by an explanation of ISO 14001 implementation, ISO 14001 organizational adoption, variations in ISO 14001, global, African, South African and Durban regional perspectives of ISO 14001 implementation inclusive of a review of the advantages and risks of ISO 14001 implementation. The chapter is concluded with a summation of the primary findings within this chapter of the study.

2.1 Background to environmental management systems

Ecological disasters are one of the primary influences on the generation of preventative measures regarding the development of standards pertaining to management of the environment (Jovanović & Janjić, 2018). Industrialization has a critical impact on the environment and people as seen within the Durban region in which residents surrounded by polluting petrochemical industries experience rampant respiratory complications (Pillay, Moodley, Hathout, & Ladochy, 2018). Within the Durban Metropolitan Area industries are responsible for the production of over one million tons of air, water and solid waste annually (Pillay et al., 2018). The introduction of environmental management systems within industry can have a potentially positive impact on environmental performance (Johnson, 2018). An ISO 14001- based EMS presents certifiable necessities for the operation and implementation of an EMS within organizations. The International Organization for Standardization generated the ISO 14001, it is a component of the ISO 14000 series of standards initiated in 1996 (Oliveira, Oliveira, Ferraudo, & Salgado, 2016).

According to Yin and Schmeidler (2009), Heras-Saizarbitoria and Boiral (2013) and Zobel (2016), the motivations behind an organization implementing an EMS are not directly associated to the effectiveness of the systems application

irrespective of associated benefits. ISO (2015c), outlined the key points listed below indicating potential overall organizational benefits of an EMS:

- Improvement in stakeholder confidence
- Increased employee engagement
- Improved operational efficiency
- Improved company reputation
- Financial advantages through cost reduction

A clear understanding of an EMS is instrumental for successful environmental management of impacts of a corporation (Vermeulen, 2018). In accordance to the ISO 14001:2015 standardisation, an EMS is designed with the aim of constructing a corporation's organizational as well as operative undertakings with the intended purpose of controlling its environmental procedures and impacts (Oliveira et al., 2016). Supporting ISO 14001 as a systems approach, there is fundamental interaction linking environmental performance through EMS implementation utilising environmental training and top management commitment (Sennoga & Ahmed, 2020).

Vermeulen (2018) confirmed that environmental management focuses primarily on the identification of environmentally acceptable practice through the assessment of direct human and environmental interactions. Furthermore, Salim, Padfeild, Hanson, and Mohamad (2018) proposed that implementation of EMSs in developing countries is one potential solution which can be adopted in order to address environmental concerns. Despite numerous studies pertaining to EMSs such as ISO 14001, a fundamental gap exists in the research regarding lack of a comprehensive investigation of the existing factors that determine EMS improvement (Ejdys, Matuszak-Flejszman, Szymanski, Ustinovichius, Shevchenko, & Lulewicz-Sas, 2016).

Within the 21st century, Environmental Risk Management (ERM) sectors within industry was growing in terms of pertinence (Hanson, Melnyk, & Calantone, 2017) and EMSs play a key role in facilitating improvement of firms' position with regards to their performance (Hanson, Melnyk, & Calantone, 2017). Despite a well-documented growth in conjunction with opportunities associated with ISO 14001:2015 adoption, empirical studies showed conflicting

conclusions regarding environmental performance among certified organizations (Diseko, 2017). Research showed varying results regarding a correlation between ISO 14001:2015 implementation and environmental stewardship (Diseko, 2017).

Morrow and Rondinelli (2002:159) stated that numerous institutions-initiated pollution prevention mechanisms in order to develop their environmental management procedures into further-reaching environmental management systems. Various international organizations, governments and industries have recognized the advantages that standards and EMSs can offer their organizations (Morrow & Rondinelli, 2002:159). Potoski and Prakash (2004) supported this and suggested that external motivations push the implementation of EMSs. Some of these external motivations for EMS implementation are listed below:

- Customer demands
- Improved stakeholder communication
- Improved stakeholder involvement
- Corporate image improvement

Furthermore, Potoski and Prakash (2004) outlined internal motivations for the implementation of EMSs as follows:

- Waste reduction
- Organizational efficiency improvements
- Improved employee motivation
- Improved customer base

In addition, improved product innovation and utilization of raw materials and legal security are also some of the major benefits identified in the adoption of an EMS (Kourti, 2011). Within the view of Potoski and Prakash (2004) the successful implementation of an EMS is entirely dependent on a corporation's capacity to identify environmental impacts and to outline specified targets to manage in addition to reducing these impacts. ISO Revisions (2015) confirmed that growing pollution threats to the environment force acknowledgement of

environmental responsibility by all organizations who do not wish to compromise their reputations in this regard.

Furthermore, Zobel (2016) and Vilchez (2017) stated that research on the impacts of EMS implementation has provided controversial results. The diversity of results in this regard highlights the requirement for further research. The largely inconsistent conclusions reached by numerous researchers relate mainly to benefits and opportunities associated with EMS implementation and are more linked directly to a specific organizational characteristic (Yin & Schmeidler, 2009:482; Heras-Saizarbitoria & Boiral, 2013:59; Hartel & O'Connor, 2014:419; Fonseca, 2015:41; Harvey et al., 2015:48; Arimura et al., 2016:565; Leehane, 2016:6; Boiral et al., 2017:21). Thus, researching SHERQ managerial perspectives of ISO 14001:2015 introduces a wealth of experiences from various organizations and such research highlights the risks to mitigate as well as opportunities to exploit within the arena of ISO 14001 implementation.

On a global scale, EMSs proved to be a promising arena for study due to their multiple proposed benefits to a company. Despite this, even on a global scale, studies have shown disparities regarding the impacts in EMS implementation. In the case of Pakistani manufacturing companies, EMSs proved to be a practicable device for corporations to strengthen commercial alliances and improve long-term business sustainability (Ejdys, Matuszak-Flejszman, Szymanski, Ustinovichius, Shevchenko, & Lulewicz-Sas, 2016).

The aim of EMS implementation is to introduce controls pertaining to the reduction of environmental negative impacts utilizing financially efficient mechanisms. This is necessary to ensure environmentally friendly efforts are cost effective (Iatridis & Kesidou, 2016:7). In addition, Vermeulen (2018) stated that the purpose of EMS implementation is not solely directed at current positive environmental outcomes but rather it additionally contributes to future environmental outcomes emanating from an organization.

The following outlines the pivotal steps involved in the development of an EMS for an organization (EPA, 2017).

1. Identification of Legal Requirements

For an organization to identify the design of their EMS, the initial step of the procedure is to outline legal requirements aligned with the products and services provided by the business. This may relate to proactive identification of waste disposal or air emission compliance stipulations. The EMS is thereby designed to encompass processes to ensure legal compliance.

Identification of environmental aspects as well as studies on related operations and product identification of organizational environmental impacts and controls must be undertaken along with recognition of regulations that underpin any organizational environmental emissions.

2. Stakeholder Perspectives

Dialogue regarding organizational environmental interaction is required with customers, employees and other interested parties in order to ascertain their viewpoints which inform environmental policy generation.

3. Environmental Policy Development

The policy should be generated utilizing the aforementioned facets of EMS development. These encompass stakeholder perspectives as well as legal requirement identification and scope of environmental policy consideration.

4. Roles and Responsibility Allocation

Staff instrumental in EMS implementation need to be identified along with their respective tasks.

5. Outlining Targets and Objectives

These need to be in line with environmental policies. Additionally, these need to consider environmental regulations. Environmental control programs in addition to operational controls, monitoring and measuring requirements are then outlined. These should be ongoing towards continuous improvement and followed by documentation control, record keeping and continuous corrective action. Consistent operational controls and systematic monitoring procedures require generation for effective EMS implementation.

6. Responsibilities

Roles facilitating the EMS need allocated job-specific responsibilities that are recorded and communicated.

7. Awareness

In addition to communication to all relevant stakeholders, training regimes pertaining to the EMS need to be undertaken regarding the EMS and any possible operational modifications. Thereafter, in addition to the preparation of an EMS manual and documentation followed by employee specific training and continuous system checking, any system shortfalls can be identified and addressed. This process is important so as to understand organizational risks and opportunities during ISO 14001 implementation.

2.1.1 ISO 14001 EMS implementation process

As indicated in Figure 2.1 on the next page, Cobe (2015) outlined the following as the key phases of EMS implementation applicable to organizations pursuing the ISO 14001:2015 certification:

Phase 1: Gap Analysis

An organization is initially tasked with the identification of the gap between the requirements of ISO 14001:2015 certification and the current state of operational functionality within the organization. This is carried out by undertaking the collection of data pertaining to the current practices being utilized by the current management system and by comparing them against the requirements of the standard to ascertain if the aforesaid standards requirements are satisfied. This also assists with the identification of the outcomes and scope intended of the EMS addressing clause 1 (scope) of ISO 14001:2015 (BSI, 2020).

Phase 2: Design and Development

The organizations managerial body outlines the scope of the management system with insights from stakeholders (also addressing clause 1- scope of ISO 14001:2015 implementation), thereafter, defining the organization’s policies

regarding the environment in addition to objectives, targets and structure of the EMS. This EMS structure is aligned with the context of the organization, the environmental impacts of the organization as well as the environmental impacts emanating from the organization thus addressing clause 4 of ISO 14001:2015 implementation which pertains to the determination of the context of the organization (BSI, 2020).

Phase 3: Implementation: Systems Continuous Improvement

The certification of the EMS is operationally inclusive of controlled documentation, controlled communication channels as well as the monitoring, measuring and review of the system to provide evidence that the system operates effectively. In addition, within this phase of implementation all the activities undertaken as well as their updated procedure are communicated to all employees who are also trained to facilitate their conformance with the updated environmental management system. Any identified points of contention are addressed to mitigate them proactively while considering product and service life cycles as per ISO 14001:2015 (Vermeulen, 2018). This phase is aligned with clause 8 (operation) of ISO 14001:2015 which addresses the execution of procedures to ensure organizational environmental target achievement (BSI, 2020).

Phase 4: Assessment and Review

Managerial review as well as an internal audit are the following steps to be undertaken within the EMS certification process which are thereafter followed by external auditing. The final phase of an organization pursing an ISO 14001:2015 certification encompasses an assessment of the operational functionality efficiency of the system through extensive managerial review and auditing to ascertain areas in which opportunities for improvement exist within the system. This coincides with clause 9 of ISO 14001:2015 implementation pertaining to performance evaluation to ensure continuous improvement (BSI, 2020).

Figure 2.1: ISO 14001:2015 Environmental Management System Implementation Procedure (Adopted from Cobe, 2015).

2.1.2 ISO 14001 Organizational adoption

The adoption of an environmental management system highlights risks and opportunities in implementing ISO 14001:2015. The paradigm of continuous improvement process implementation as outlined by Cobe (2015) forms the foundation supporting an ISO 14001:2015 EMS. Such a systematic implementation process encompasses phases of planning, activity implementation, activity checking, and activity correction, alternatively regarded as “Plan-Do-Check-Act” within the adoption of an ISO 14001 certifiable EMS (Maliwatu, 2018). The Plan-Do-Check-Act paradigm is adopted by ISO 14001 certified organizations to generate environmental policies and subsequent steps required to be undertaken in order to achieve and monitor environmental targets (Papagiannakis, Voudouris, Lioukas, & Kassinis, 2019). Within the ISO 14000 series the ISO 14001:2015 standard is regarded as the primarily adopted standard as other standards within the series are supplementary (Ahmed & Mathrani, 2019).

In contrast to Vermeulen (2018) who indicated risks in adopting the ISO standards as evolving, Ahmed and Mathrani (2019) suggested that low costs of adopting the ISO 14001 certification is one of the primary reasons companies

pursue it. Ferron-Vilchez (2016) support the findings of Ahmed & Mathrani (2019) relating that organizations in over 155 nations have adopted ISO 14001 standard in order to advance their performance environmentally. In addition, the ISO 14001 standard is the only standard which is recommended for the aim of auditing and accreditation purposes within the ISO 14000 series (Franchetti, 2011). Furthermore, Manurung and Rachmat, (2019) state that implementation of ISO 14001:2015 additionally has a constructive bearing on social responsibility.

Potoski and Prakash (2013) outlined that the requirement for the generation of standards pertaining to environmental management was initiated through the 1992 United Nations Conference on Environmental and Development (UNCED) Convention. ISO 14001 is the most popular environmental management standard affiliated to EMSs within organizations.

In addition, The ISO 14001 standard is the most commonly adopted standard globally in terms of EMSs. Over 300 000 organizations have been ISO 14001 certified in an effort to advance their performance environmentally (Iatridis, Konstantinos, & Kesidou, 2018). According to the study undertaken by Latan, Jabbour, de Sousa, Wamba, and Shahbaz (2018), empirical findings demonstrated a significant correlation between organizational environmental strategies, commitment from top management, and uncertainty regarding the environment which can advance the environmental performance of organizations. This shows the importance of top management commitment as being a key component of environmental performance regarding SHERQ and ISO 14001:2015 adoption and implementation within organizations. These perspectives of ISO 14001 implementation from SHERQ managers in the Durban region will be analysed within this study. Environmental attitudes of staff as well as managers are a key causal connection to positive environmentally cognizant actions and decision-making within organizations (Sennoga & Ahmed, 2020).

Commitment from all personnel within an organization is an essential facet of a successful EMS (Vermuelen, 2018).

After an assessment of 2076 firms within the United Kingdom, Demirel, Iatridis, and Kesidou (2018) concluded that externally certified EMSs can fill a void by substituting for weakening environmental regulations stipulated by the state (weakening of state resolve may be attributed to financial constraints and national investment compromise) that confirms the confidence placed in EMSs and their reach in the arena of environmental impact reduction and control.

Multinational corporations as well as various small to medium enterprises were assessed within the Guangdong province in China to show that EMSs presented numerous weaknesses in terms of their lack of coherence with sustainability goals (Pesce, Shi, Critto, Wang, & Marcomini, 2018).This finding supports the argument presented by Vermeulen (2018) stating that EMS implementation perceptions are organization-specific. Furthermore, Pesce et al. (2018) stated that concerns were raised among Chinese enterprises in regard to the high costs of EMS implementation while Ejdys et al. (2016) highlighted EMS implementation feasibility. In addition, as a component of comprehending the context of an organization, the ISO 14001 standard also requires that the reach of the EMS be defined in terms of its scope (Maliwatu, 2018). This therefore broadens the arena of factors contributing toward risks and opportunities regarding ISO 14001 i.e., organizations specifications and EMS scope.

The focal point of this study involves managerial perspectives of the risks and opportunities of ISO 14001 implementation. Supporting the aforementioned research effort IRM (2002:2); ISO, (2009a), ISO (2015a) stipulate that risks and opportunities should not only be assessed pertaining to activities but also with regards to affected stakeholders.

2.1.3 Variations in ISO 14001:2004 and ISO 14001:2015

There are numerous variations between the 2004 and 2015 versions of ISO 14001 (Vermeulen, 2018). The latter version clarifies definitions of terminology pertaining to streamlining of operational functionality, thus, presenting a potential opportunity to organizations within Durban, the area involved in the current study. Enlisted below are the pertinent variations from the ISO 14001:2004 to the ISO 14001:2015 standard suggested by Vermeulen (2018).

Top management involvement increases

The ISO 14001:2015 standard differs from the 2004 revision with regards to the clearly outlined requirement for total interdepartmental as well as top management accountability and involvement within all operational facets. This further relates to the pertinence of SHERQ managerial perspectives of ISO 14001 implementation as a possible continuous improvement opportunity, something which is currently not addressed within the Durban region as this knowledge has not yet been assimilated and has potential benefits to novice SHERQ managers implementing the standard who are unaware of the primary risks and opportunities involved. This suggests a gap in the body of knowledge in this regard.

Consideration of Environmental Impacts

Environmental impacts on employees as well as associated protective measures were not incorporated in the 2004 ISO 14001 revision. The ISO 14001:2015 version includes environmental impacts pertaining to an organization and promotes various proactive measures.

The environmental impacts of industrial production processes taking place within the Durban region have been extensively assessed and documented and, despite this, there exists a gap in the body of knowledge regarding the top managerial perspectives of these environmental impacts. This provides an opportunity to implement ISO 14001:2015 to address this gap. Furthermore, analysis of the opportunities and risks of ISO 14001:2015 implementation within the Durban region will clarify whether these aspects have been effectively delineated.

Production Life Cycle Inclusion

Services as well as products have potential environmental impacts from “cradle to grave’’, otherwise regarded as potential environmental impacts from the initiation of the production process to the post disposal stages. The 2015 revision of the ISO 14001 standard takes this into consideration and this is especially pertinent within the Durban region as the life cycle of numerous products manufactured in the region are inclusive of various by-products with

potentially harmful environmental impacts associated with their storage and release into the environment (South Durban Community Environmental Alliance, 2020).

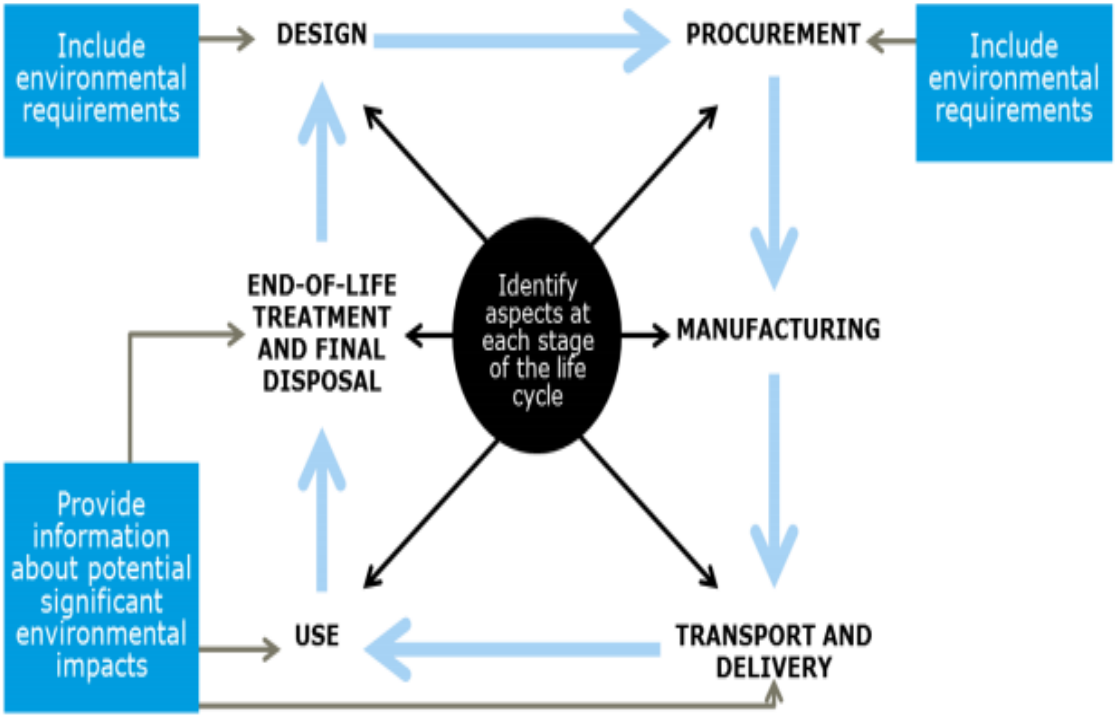

Figure 2.2: Lifecycle and environmental requirements of ISO 14001:2015 (Adopted from Roberts, 2020).

Proactive Reporting regarding compliance

The revised ISO 14001:2015 standard details proactive reporting of environmental concerns, this is essential to the Durban region that has a history of reactive planning in response to environmental concerns (South Durban Community Environmental Alliance, 2020).

Such proactive environmental reporting between stakeholders can facilitate a platform of communication in order to work toward potential environmental impact mitigation strategies. An analysis of whether this potential benefit is currently being presented in the Durban region is necessary as it is a potential benefit to hone in on in the revised standard of ISO 14001.

Continuous Improvement

The streamlining of operational functionality within organizations can be further achieved through the ISO 14001 clause regarding continuous improvement to meet planning and implementation targets by organizations. Unfortunately, targets as per specific industries are lacking and so the effectiveness of this clause is largely unclear, and this further motivates the need for detailed analysis of translating management perspectives into effective ISO 14001:2015 implementation.

In addition to the aforesaid, according to Svartson (2017) key amendments to the standard additionally include risk-based thinking, this applies not only to identified risks but also to identified opportunities regarding risk mitigation and opportunity utilization within the revised standard. The additions to the standard in the fourth section of the standard also not only pertain to the internal understanding of organisations and their context, but it is additionally a novel requirement to determine the requirements as well as the expectations of interested parties such as stakeholders that are pertinent to EMSs.

2.2 Global perspective of ISO 14001 EMS implementation and certification

The International Organization for Standardization (ISO) 14001 EMS standard stipulates a guideline for continuous improvement in a corporation, for businesses to meet targeted performance goals in terms of the environment (Salim, Padfield, Hansen, Mohamad, Yuzir, Syayuti, & Papargyropoulou, 2018). Empirical evidence with regards to the impacts of environmental management system implementation have shown inconsistent conclusions pertaining to their positive outcomes (Rehfeld, Rennings, & Ziegler, 2007). Some studies have shown no conclusive relationship between environmental product innovation and environmental management system adoption (Rennings, Ziegler, & Ankeleand Esther, 2006; Wagner, 2007, 2008).

The adoption of the ISO 14001 certification within an organization serves as a mechanism to demonstrate sustainable production process commitment (Salim

et al., 2018). Delmas (2001) stated that EMSs represent a set of standards which are very flexible and do not provide much guidance regarding their implementation. Thus, the implementation of EMS often results in various outcomes possibly dependant on organization specific characteristics (Yin & Schmeidler, 2009). Nonetheless, organizations certified with ISO 14001 have increased from 188 574 in 2008 to 346 147 in 2016 and third-party auditing is required for an organization to be certified (ISO, 2016). This highlights the importance of novel research to assess ISO 14001 risks in the Durban region as these could potentially clarify the reasoning behind the various outcomes of EMS implementation.

Stakeholders are often not able to assess the organizations environmental performances as well as implicit implementation of policies, and therefore certain organizations' EMS intentionally show organizations' environmental commitment to stakeholders (Bowen & Aragon-Correa, 2014). In support of this, Delmas and Montes-Sancho (2010) stated a symbolic adoption of ISO 14001 resulted from competitive pressure when in reality, organizations may have a poor environmental performance record (Boiral, 2007). Vilchez (2017) argued that certain organizations adopt the ISO 14001 certification purely symbolically as a mechanism through which their environmental performance may be legitimized. Furthermore, certification of certain firms was achieved without any demonstrated environmental commitment. Curkovic and Sroufe (2011) supported this argument by stating that the limited focus on continuous improvement pertaining to the environment limits environmental impact reduction. This further demonstrates the importance of understanding the risks of ISO 14001:2015 implementation for organizations and managerial staff within the Durban region who might potentially circumvent non effective implementation of this standard.

Vilchez (2017) argued further that a company certified with ISO 14001, rather than improving environmental performance, could still produce significantly large amounts of waste thus rendering certification symbolic in nature, rendering certification futile (Curkovic and Sroufe, 2011). Riaz, Saeed, Baloch, and Khan (2019) concurred with Curkovic and Sroufe (2011) further by stating that the implementation of ISO 14001 entirely symbolically may have damaging

impacts to the entirety of the initiatives trustworthiness, therefore highlighting the importance of further research in this field aimed at employees such as SHERQ managers who are directly engaged with the implementation of EMSs.

Thus, stakeholder perceptions regarding compliance to ISO 14001 implementation is critically important (Aravind & Christmann, 2011). Yadav, Prayag, Lal, Seung Hun Han, and Jee Jeung Rho (2016) suggested that market performance is indecisive and may be neutral, negative or positive thus, regional assessments are important in this regard as shown in a study conducted by Zobel (2018) among manufacturing companies in Sweden where it was concluded that regionally specific assessments of the risks and opportunities of ISO 14001 were important due to the substantial requirements it presents in relation to its realized benefits to an organization.

2.3 African perspectives of ISO 14001 EMS certification

Within developing countries in Africa significant increases in the quantity of ISO 14001 accredited organizations are evident, between 2014 and 2015 a 19% increase in certifications were reported (Tene, Yuriev, & Boiral, 2018). Figure 2.3 shows the global and African increase since 2005 in ISO 14001 certifications. An ISO survey demonstrated 358 953, ISO 14001 certifications had been achieved globally and among them 1 230 were achieved within South Africa (ISO, 2017).

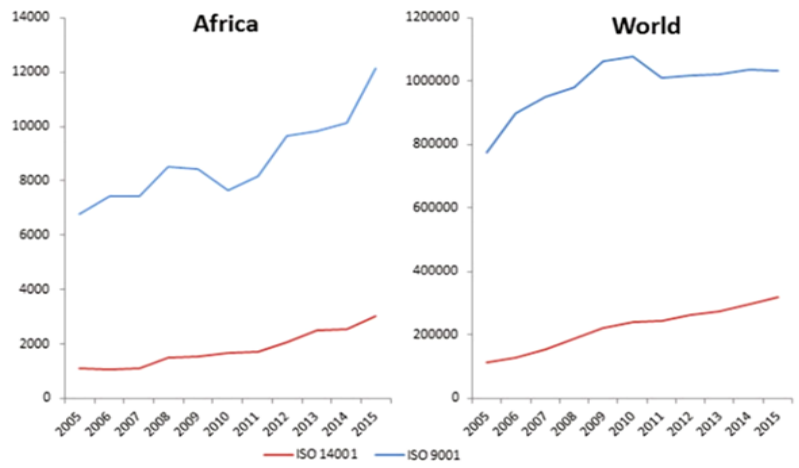

Figure 2.3: Global and African certification of ISO 9001 and ISO 14001 (ISO, 2016a)

As illustrated in Table 1, the adoption of the ISO 14001:2015 certification within Africa is largely unbalanced as nearly 70% of certifications are concentrated within the relatively highly developed economies of South Africa and Egypt (Tene et al., 2018).

Table 1: Adoption of ISO 14001 standard in Africa (ISO, 2016a)

Ranking	Countries	ISO 14001	% of total in Africa
1	South Africa	1192	39.42
2	Egypt	850	28.11
3	Tunisia	230	7.61
4	Morocco	170	5.62
5	Algeria	102	3.37
6	Nigeria	59	1.95
7	Kenya	50	1.65
8	Tanzania	31	1.03
9	Zimbabwe	28	0.93
10	Ghana	26	0.86

2.4 ISO 14001:2015 certifications in South Africa

Historical studies have shown that in South Africa, environmental management does not entirely encompass the ideals of integrated environmental management due to the division denoted in responsibilities among the three spheres of government, and therefore it has been described as an understaffed and underfunded effort undertaken by local and provincial authorities (Hill, 2000).

In contrast, a recent study found a positive correlation between environmental performance and ISO 14001:2015 implementation within a South African context (Diseko, 2017). In addition, Arts and Faith-Ell (2012) confirmed this in their study by noting environmental benefits of environmental management such as green procurement mechanisms. South Africa has implemented the adoption of the SANS 14001:2015 standard which complies with the South African Bureau of Standards (Piek, 2019). However, an updated and comprehensive outline of the studies on ISO 14001 in South Africa is currently lacking and it is key to assess the primary study patterns within this arena to illustrate contradictory conclusions as well as unexplored areas of research to identify areas of potential improvement (Santor, 2019).

2.5 ISO 14001 Certification perspectives from the Durban region

The poor air quality released on a daily basis emanating from the chemical as well as petrochemical industries is responsible for a high cancer rate in addition to cancer deaths within South Durban, the region is now also disreputably referred to as “Cancer Alley”, this has resulted in residents enduring high medical expenses and burial costs (South Durban Community Environmental Alliance, 2020). According to the South Durban Community Alliance (2020) the responsible industries are currently not held accountable in lieu of high profits generated to the detriment of communities in close proximity to the polluting industries.

Figure 2.4: Location of the study area Durban, KwaZulu-Natal (eThekwini Municipality Roads Management Map Viewer, 2020).

Figure 2.4 displays a map illustrating the location of the study area, the Durban region which is situated within the province of KwaZulu-Natal (eThekwini Municipality Roads Management Map Viewer, 2020).Chemical plants, petroleum refineries, paper and pulp plants within the southern areas of Durban have overburdened the environment within the region (Hathout, Ladochy, Moodley, & Pillay, 2018).

According to Peek (2020), South Durban is the primary industrial epicentre of Durban, where one of the largest oil refineries operational within South Africa, refining approximately 60% of South Africa's petroleum is located. In addition,

it has largest concentration of petrochemical industries within South Africa in addition to wastewater treatment works, various toxic waste landfill sites as well chemical industries (Peek, 2020). This author regards this petrochemical basin as the “Durban poison” which excessively overstrains poor societies with environmental stressors.

Figure 2.5: Air pollution in south Durban. Photograph provided by the South Durban Community Environmental Alliance (2020).

Figure 2.5 illustrates the emissions emanating from the burning of chemicals in order to facilitate the production of industrial products (South Durban Community Environmental Alliance, 2020).

As mentioned, ISO 14001 is a globally accepted international standard, and Da Fonseca (2015) stated that environmental advancement can be obtained by organizations when impacts to the environment are methodically recognized and controlled to contribute to sustainability. These involve mechanisms of improved environmental performance, pollution prevention as well as environmental law compliance that could substantially improve environmental sustainability within the Durban region.

According to Sennoga and Ahmed (2020), research has shown that ISO 14001-certified businesses within the Durban region are prioritizing environmental

management as well as training competencies primarily within the SHERQ and SHE occupational roles. Therefore, an assessment of the opportunities emanating from ISO 14001:2015 implementation should represent an interactive and dynamic undertaking to optimize implementation operations while providing a foundation of motivation for uncertified organizations. Unfortunately, this study also reported a dearth of organisational culture that impedes improvement within the Durban region specifically but provides an opportunity to advance the understanding of ISO 14001 training among SHERQ managerial staff within the Durban region to improve environmental performance (Tung, Baird, & Schoch 2014).

The study by Perron, Cote, and Duffy (2006) indicated that financial commitment from top management significantly increased the chances of positive environmental performance but studies on ISO 14001:2015 implementation within the Durban region have not focussed on the SHERQ managerial perspectives standpoint. Thus, the current study addressed this gap in the literature.

In support of this, Johnson (2018) stated that little research has been documented as to benefits which may accrue to organizations in South Africa which have been ISO 14001 certified. In addition, Salim, Padfield, Hansen, Syayuti, and Papargyropoulou (2018) and Pacana (2019) suggested that successful ISO 14001:2015 implementation has the potential to streamline and increase operational efficiency - some of the numerous opportunities emanating from adopting the ISO 14001 standard.

2.6 Advantages of implementing ISO 14001:2015

ISO 14001:2015 implementation is aligned with numerous opportunities and advantages to organisations (ISO, 2015a). The aforementioned advantages and opportunities are detailed below.

2.6.1 Environmental targets

The implementation of ISO 14001:2015 presents numerous potential opportunities and benefits to organizations, among which are the provision of a framework enabling them to respond to variations in environmental conditions

in balance with socio-economic requirements (Piek, 2019). Thus, organizations may appropriately respond to environmental factors such as waste management (Aguiari et al., 2016) and so compliance to the ISO 14001:2015 standard allows organizations to be more environmentally proactive (Vermuelen, 2018). Furthermore, Vilchez (2017) supported that ISO 14001:2015 does present various potential environmental opportunities for organizations to achieve their envisioned targets and goals regarding their environmental management systems (ISO, 2015a).

In addition, Vilchez (2017) highlighted the importance of stakeholder perspectives such as top managerial employees in ISO 14001 implementation as contributory factors to possible success, indifference or potential failure of perceived positive outcomes of ISO 14001:2015 opportunities. As previously mentioned, no current studies have been conducted in the Durban region as to SHERQ managerial perspectives of the opportunities of ISO 14001:2015 implementation and knowledge of such factors may improve ISO 14001:2015 implementation.

2.6.2 Financial perspective

Latridis and Kesidou (2018) as well as Salim, Padfield, Hansen, Syayuti, and Papargyropoulou (2018) stated that the adoption of ISO 14001:2015 substantially contributes to the commercial and financial benefits of an organization, suggesting that a firm has the potential to reduce costs and obtain financial development opportunities following ISO 14001:2015 standard certification. This finding is largely inconsistent with the findings of Waxin, Knuteson and Bartholomew (2019), who concluded that financial drivers were not among the key motivations or opportunities associated with ISO 14001:2015 implementation but rather that the high costs of ISO 14001:2015 implementation were in fact one of the key challenges identified in their study within both private and public firms.

This relates to the importance of assessment of the opportunities of ISO 14001:2015 as the current body of knowledge in this respect is principally conflicting and requires regionally specific assessment. Moreover, despite some studies reporting inconclusive findings, the prevailing viewpoint in the

literature suggests that EMSs do strengthen and foster measures toward the financial performance of an organization (Murmura, Liberatore, Bravi, & Casolani, 2018). Musa and Chinniah (2016) highlighted the importance of financial inputs required to implement ISO 14001:2015 successfully, thus highlighting the fact that should an organization not have the continuous necessary financial inputs required this may challenge the implementation and maintenance of the ISO 14001:2015 certification, hence requiring current research, particularly in the Durban region.

As stated by Di Noia & Nicoletti (2016), an important aspect in this context is the identification of employees, such as SHERQ managers, and their training as to ISO 14001:2015 implementation.

In a South African context, research conducted by Johnson (2018) concluded that the adoption of ISO 14001:2015 presented numerous beneficial opportunities to organizations including increased return on investment from a perspective regarding long term operation, which justified short-term implementation costs of the standard. Vermuelen (2018) agreed that the operational savings introduced by implementation of ISO 14001:2015 offset the initial implementation costs.

2.6.3 Regulatory perspective

Waxin, Knuteson, and Bartholomew (2019) stated that one of the primary opportunities of adoption of ISO 14001:2015 is the opportunity for a firm to more comprehensively comply to environmental standards and regulations. Vilichez (2017) agreed with this by concluding that statutory compliance improvement was one of the key opportunities of adopting the standard.

Third party auditing is required to obtain the ISO 14001:2015 certification so that findings, including non-conformance, are recognized, documented, and communicated by the auditor to the auditee (Nel & Alberts 2016). ISO 14001:2015 outlines non-conformance as standard requirements remaining unfulfilled (Piek, 2019) and non-conformance reporting processes are an important facet of ISO 14001:2015 auditing and certification as it provides an opportunity to proactively implement mitigation strategies pertaining to

environmental developments. Thus, the current investigation should provide insights into perspectives of SHERQ management in the Durban region regarding their proactive attendance to prior identified non-conformances in day-to-day operations.

2.6.4 Corporate image perspective

Jiang and Bansal (2003) suggested that the adoption of ISO 14001:2015 may possibly benefit an organization by providing the prospect to a corporation to enhance their reputation. Murmura, Liberatore, and Casolani (2018) agreed with the findings of Jiang and Bansal (2003) that improvement of corporate image correlated with the implementation of ISO 14001:2015. Boiral et al. (2017) agreed that ISO 14001:2015 implementation may be coupled with increased customer satisfaction and a possible improved perception of the organization by customers to contribute to an improved corporate image.

2.6.5 Employee perspective

Hill (2000) suggested that there is an intricate interconnection between relevant stakeholders such as employees within an organization that is an essential foundation leading to the success of an EMS that facilitates the flow of budgets as well as decision-making procedures.

As such, the current study primarily focused on SHERQ managerial employee perspectives in the Durban region as to their perceived roles in the execution of an EMS. Thus, understanding their viewpoint pertaining to the opportunities and risks of ISO 14001:2015 implementation is a pivotal assessment that ensures appropriate corrective action.

Furthermore, Murmura, Liberatore, and Casolani, (2018) reported improvements in employee outputs following ISO 14001:2015 certification. This emphasized the need in the current study to determine SHERQ managerial employee perceptions of ISO 14001:2015 implementation in the Durban region.

Pesce, Critto, and Marcomini (2018) suggested that one of the improvements from implementing the ISO 14001:2015 standard is the strengthening of communication systems which, in turn, could improve stakeholder

engagement, customer and employee communication relations and improve customer and employee satisfaction (Boiral et al., 2018).

Musa and Chinniah (2016) highlighted the following benefits of ISO 14001:2015:

- Improved employee satisfaction
- Improved employee motivation
- Improved employee knowledge
- Improved employee communication
- Improved employee teamwork

Investigating these important employee benefits would add value to a study in the Durban region.

2.6.6 Sustainability and environmental performance

Adaptation of ISO 14001 may potentially contribute to environmental sustainability as numerous studies have presented findings that indicate organizations with pro-active environmental planning and operational functionality have significantly increased control over their respective costs (Curkovic, Sroufe, & Melnyk, 2005; Lebonan, 2010; Diaz de Junguitu & Allur, 2019).

In a South African context, Maliwatu (2018) suggested that ISO 14001:2015 certification contributed to sustainability but despite this, research has presented inconclusive results pertaining to the connection between certified EMS implementation, sustainability as well as improved effort and performance environmentally (Heras Saizarbitoria et al., 2015; Zobel, 2018; Siano, Vollero, Conte, & Amabile, 2017; Vilchez, 2017; Merli & Preziosi, 2018; Poltronieri et al., 2019). Thus, this study would address the gap in the body of knowledge in a South African regional context.

Jovanović and Janjić (2018) conducted questionnaire-based research involving the management of 33 companies which were obliged to submit their respective data pertaining to environmental contamination to the National Pollution

Register. Research data from this study were analysed using non-parametric tests, quantitative and descriptive statistics. Findings from the study suggested that the introduction of the ISO 14001:2015 standard cultivated environmental responsibility and initiated the image of a socially responsible organization, and that these benefits were synthesized through the betterment of organizational efficiency, environmental performances as well as profitability (Jovanović & Janjić, 2018). In support of these findings, Johnson (2018) and Da Fonseca (2015) added that involvement of top management in environmental performance improved environmental responsibility among organizations which had adopted ISO 14001:2015.

Thus, research involving SHERQ managerial employee perspectives pertaining to implementation of ISO 14001:2015 in a regional context should provide further insights into meeting both external as well as internal objectives and targets outlined by management (Vermeulen, 2018) including shifting the supply chain and procurement operational focus to a more environmentally friendly approach (Diseko, 2017).

2.6.7 Stakeholder engagement

Implementation of ISO 14001:2015 appears to contribute toward proactive interdepartmental communication lines regarding environmental projects undertaken by employers (Maliwatu, 2018). This finding was supported by Waxin, Knuteson, and Bartholomew (2019) in their study which showed that increased stakeholder engagement as well as increased levels of communications was a pivotal opportunity presented through the implementation of ISO 14001:2015.

2.6.8 Continuous improvement

Alignment of the adoption of ISO 14001:2015 to continuous improvement is considered a key organizational opportunity of implementation and certification of an EMS (Di Noia & Nicoletti, 2016).

2.7 Risks associated with implementation of ISO 14001:2015

Despite the numerous advantages of ISO 14001:2015 implementation, organizations may potentially face risks which emanate from the implementation of the standard (Vilchez, 2017). These risks are analysed below.

2.7.1 Symbolic adoption

Symbolic implementation of ISO 14001:2015 relates to an organization using the certification as a mechanism to legitimize practices regarding the environment but not necessarily undertaking commitment pertaining to the environment (Aravind & Christmann, 2011; Demirel, Latridis, & Kesidou, 2015; Di Noia & Nicoletti, 2016).

Thus, Vilchez (2017) indicated that organizations which had adopted ISO 14001:2015 but did not invest significant resources pertaining to the updating of their EMSs did not have significantly different environmental performance in comparison to those organizations which had in fact not adopted the certification at all.

2.7.2 Top-down approach

Vermeulen (2018) highlighted that one of the key risks of ISO 14001:2015 implementation is the presence of a top-down approach to implementation to compromise employee insights and involvement in the process. This reinforces the importance of a study to assess management attitudes toward ISO 14001:2015 implementation in the Durban region.

2.7.3 Lack of understanding

Pesce, Critto, and Marcomini (2018) and Pacana (2018) outlined a major risk of ISO 14001:2015 implementation as being a lack of employee understanding of the standard. In addition, they stated that insufficient competency training led to a distorted interpretation of effective implementation of the standard coupled with a lack of employee motivation, both of which contribute to symbolic adoption of the ISO 14001:2015 standard. Current managerial perspectives on

ISO 14001:2015 training within the Durban region specifically has not been ascertained and thus shows a gap in the body of research.

2.7.4 Inadequate resource allocation

Waxin et al. (2019) stated that inadequate support from upper management, in addition to employee pressures, lack of adequate regulatory processes, high costs and lack of qualified staff in conjunction with inadequate time resources were among the key risks which impacted on the effective implementation of ISO 14001. In addition to these factors, Pesce, Critto & Marcomini (2018) highlighted the lack of time allocation pertaining to ISO 14001:2015 implementation.

A study undertaken by Musa and Chinniah (2016) determined the following enlisted risks regarding resource inadequacy experienced in an organizational attempt to achieve ISO 14001:2015 implementation while including the life cycle assessment within the ISO 14001:2015 paradigm:

- Inadequate technology access.

An inadequacy regarding access to technological advancements can result in a statistically inaccurate analysis of the environmental aspects of a product or services.

- Lack of financial backing.

Organizations require considerable financial investment into human resources as well as time required to research the entirety of a product's environmental impacts throughout its production stages.

- Inadequately documented information.

The administrative segment of the assessment of the life cycle of ISO 14001:2015 is considerably amplified should an organization track the inputs and outputs in their production line. Inadequate administrative support presents a risk in this regard.

- Poor communication channels established by a lack of communication specialists between internal and external stakeholders.

There are no compulsory guidelines pertaining to a product's life cycle assessment and the disclosure of the aforesaid assessments; regarding results are released on a voluntary basis and this is decided upon by the organization itself to create the risk of lack of transparency should the organization chose not to release negative environmental impacts of their production stages.

2.8 Summary of Literature Review

Chapter 2 presented a literature review surrounding the ISO 14001:2015 standard certifying an EMS as well as its nationally and internationally perceived opportunities and risks to achieve objective 1 of the study.

An EMS is a tool for organisations which entails multiple organisational benefits to corporations inclusive of potentially improved environmental performance, an ISO 14001:2015 certification of an EMS encompasses various phases of implementation in order to ensure comprehensive integration of the EMS into the operational facets of a business. There are various variations from the 2004 version to the 2015 version of the ISO 14001 standard, the inclusion of the life cycle assessment of goods in the 2015 revision was a key example of this. Globally, the ISO 14001:2015 standard is the most popular environmental standard adopted among organizations, in Africa; South Africa and Egypt have achieved the highest amount of ISO 14001 certified organizations in the continent. ISO 14001 implementation introduces numerous potential environmental benefits such as improved resource management and risks such as symbolic adoption which made its assessment in the "pollution hotspot" of Durban, Kwazulu-Natal a key undertaking.

A description from the Durban region SHERQ managerial viewpoint of ISO 14001:2015 was shown to be absent in the body of knowledge and supports the need to conduct a research study to review the dynamic and specific nature of certification success and failure among industries and firms in Durban.

Such dynamic and essential developments such as ISO 14001:2015 implementation will constantly present risks and opportunities and so it is

essential to constantly identify these risks and opportunities to facilitate overall continuous improvement. This study will contribute a fresh internal perspective within organizations upon which they can implement progressive improvements regarding their environmental impacts. This study is a key contribution to the SHERQ discipline regarding the proactive organisational streamlining of ISO 14001:2015 implementation risks and opportunities endeavoured under SHERQ management.

The following chapter will describe the study and review the methods used to collect and analyse study data.

Chapter 3: Research Methodology

3.1 Introduction to the research methodology

Research may be understood as methodical and scientific assessment pertaining to a specific topic and hence can be noted as a scientific investigation (Kothari, 2004). Research methods are defined as the techniques and tools utilized for the undertaking of research (Walliman, 2017). Further to these, researchers utilize systematic procedures, encompassing the assemblage, examination and interpretation of data; thus, improving their comprehension of various occurrences or facts they deem concerning (Leedy & Ormrod, 2010). Chapter 3 presents research methods utilized for the purpose of data assemblage and analysis used to achieve the study objectives outlined in chapter 1.

3.2 Research methodology and methods overview

Queirós, Faria, and Almeida (2017) stated that quantitative research is well-structured and immediate, requiring short research periods in comparison to qualitative research, and is external from the researchers' point of view, whereas qualitative studies are undertaken from an internal viewpoint of a researcher. Quantitative research methodologies require the researcher to apply prior established or pre-determined response categories within which the study participants' various perspectives are expected to fit (Yilmaz, 2013). Rahman (2017) stated that the advantages of quantitative research methodologies are inclusive of the capacity to sample a larger sample proportion and, in addition, quantitative research does not necessitate a relatively extended period for the purpose of data assimilation.

Taking this into account and given the time frame in which to accomplish this study a quantitative study was selected. It was also noted that limitations of quantitative research include taking brief glimpses of an occurrence that are, thus, not in-depth and do not describe nor extended experiences of numerous subjects (Rahman, 2017).

Research methodologies are required to be chosen in order for them to compliment the problem statement of the study (Layder, 2012), particularly in regard to the current study that involved an analysis of SHERQ managerial perspectives of the opportunities and risks of ISO 14001:2015 implementation in the Durban region. Methods that were selected were carefully chosen to accomplish the aim of the study by addressing study objective 1 that was to conduct a literature review to identify key performance areas to inform an evaluation framework. Study objective 2 allowed for the development and submission of questionnaires that were outlined in order to collect the required results from participants in the study for the purpose of statistical analysis (Maxwell, 2008). These questionnaires contained pre-determined responses categorized according to the Likert scale, hence further indicative of a quantitative study (Choy, 2014). Study objective 3 involved the analysis of the responses from study participants to identify risks and opportunities concerning optimal implementation of ISO 14001:2015 in Durban.

As prior mentioned, to identify ISO 14001:2015 implementation opportunities and risks internationally and nationally; the means of an extensive review of international as well as national literature sources was undertaken. To generate an evaluation framework to assess SHERQ managerial perspectives of risks and opportunities of ISO 14001:2015 implementation within Durban, the identification of KPI's and KPA's were undertaken in order to underpin the evaluation framework to generate questionnaires as outlined in table 2 below; thus, ensuring the addressing of the primary facets aligned with ISO 14001:2015 implementation risks and opportunities. The analysis of SHERQ managerial responses to the ISO 14001:2015 implementation risks and opportunities within the Durban region was undertaken via a quantitative statistical assessment of feedback from questionnaires which were posed directly to the aforesaid target audience to ensure objective findings.

The following steps were conducted for the primary data assimilation segment of the research and included the 3 phases outlined below.

3.3 Data collection and assessment phases

Phase One

Literature review is utilized as a medium through which studies are assessed in order to achieve an understanding of various ideas and their relationships, these ideas combine to form the body of knowledge pertaining to the research arena (Hart, 2018). Furthermore, this author suggested that a literature review provides clarity regarding what has already been researched in an arena as well as how this has been undertaken to identify key areas in the body of knowledge relevant to the study. Therefore, the study began with a detailed assessment of literature pertaining to the opportunities and risks of ISO 14001:2015 both nationally as well as internationally for the purpose of achieving contextual understanding in terms of the Durban region in order to achieve objective 1 of the study. This enabled the development of key performance indicators (KPI) and key performance areas (KPA) which were included in the preparation of a questionnaire shown in phase two of the methods in the studies progression. In order to achieve the extensive literature review key terms such as ISO 14001:2015, SHERQ and ISO 14001 implementation risks were searched via academic search engines such as Google Scholar and JSTOR (Journal Storage) in order to filter the relevant academic articles pertaining to them.

Phase Two

Phase 2 was primarily comprised of questionnaire development and distribution informed by the literature review undertaken in phase 1. The figure below provides a summary regarding the identification and utilization of the concepts identified within the literature search as being grouped key performance indicators for the purpose of generating an evaluation framework upon which the questionnaire was based.

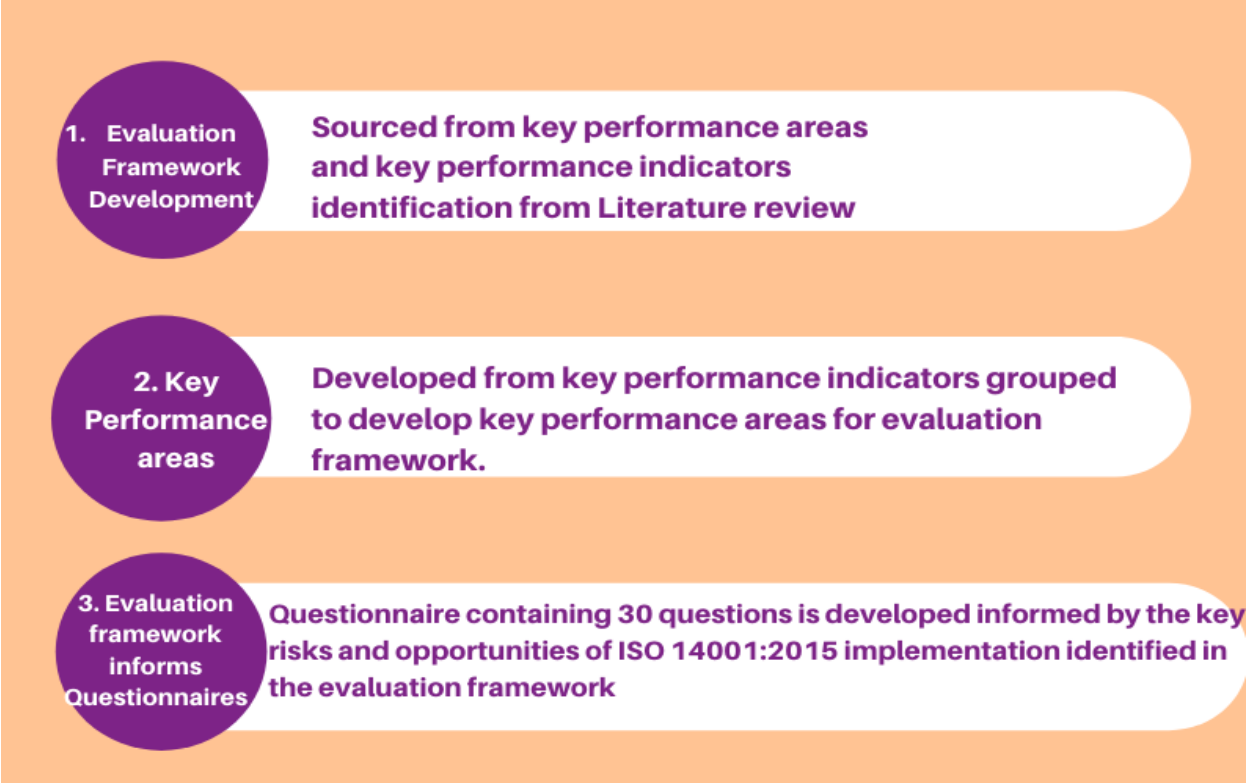

Figure 3.1: Questionnaire development procedure

Patton (1990) states that one is engaged in evaluation when the judgement and analysis of a study is undertaken with the aim of identification of key indicators in a target arena. Furthermore, evaluation research is carried out when analysis of pertinence is conducted empirically and methodologically through meaningful assessment and careful assemblage of data (Patton, 1990). Table 2 comprised a precis of the sources of published international and national studies which were used to ascertain vital aspects in the ISO 14001:2015 implementation risks and opportunities arena. Retief (2007a) indicated that the outlined objectives emanating from pivotal research evaluation were used to generate KPI's. KPA's were generated through the grouping of aligned KPI's, as shown in table 2. The key performance areas were thereby generated through the amalgamation of EMS elements comprising the "Plan-Do-Check-Act" model (Cobe, 2015) of EMS following ISO 14001:2015 implementation coupled with implementation risks and opportunities (Maliwatu, 2018). Categorization of KPA's was in accordance with BSI (2016) assessment of the "Plan-Do-Check-Act" elements. Table 2 below illustrates the Key Performance Indicators (KPI's) assessed in the questionnaires regarding ISO 14001:2015 implementation risks and opportunities, the associated Key Performance Areas

(KPA's), objectives and their sources as identified within the literature review. Thus, the aforementioned illustrates the linkage between the extensive literature review undertaken and the key concepts which underpin the questionnaires.

Table 2: Evaluation Framework

Links between assessed literature and KPI'S			
Key Performance Indicator (KPI) assessed in questionnaire regarding ISO 14001:2015 implementation risks and opportunities "Questions developed as a measure of perceived performance in relation to objectives (Marr, 2019)"	Key Performance area (KPA)	Objective	Source identified in Literature Review
Questions asked the extent of agreement with the subsequent:	Key areas related to ISO 14001:2015 implementation (BSI, 2016).	Objectives are regarded as the facets which require achievement (Maxwell, 2008).	Critical national and international studies assessed.
Section A			
1. The increase in leadership responsibilities regarding ISO 14001 implementation at an organization results in increased top management involvement.	[Plan] Outlining top management involvement.	Increased participation in ISO 14001:2015 implementation from top management.	(Da Fonseca, 2015)

2. An ISO 14001:2015 certified organization meets community and public expectations regarding environmental performance.	[Plan] Ascertaining environmental Performance targets.	Environmental performance enhancement by mitigating environmental impacts.	(ISO, 2015 & Diseko, 2017)
3. There are increased investor inputs.	[Plan] Ascertaining Investor Inputs.	Budgeted financial inputs for ISO 14001:2015 implementation.	(Musa and Chinniah, 2016)
4. Top management implement proactive environmental measures at ISO 14001:2015 certified organizations.	[Do] Reporting and monitoring environmental Protection.	To report and communicate proactive environmental projects undertaken to employees.	(Maliwatu, 2018)
5. Employees are better committed to environmental sustainability at ISO 14001:2015 certified organizations.	[Do] Reporting and monitoring environmental Protection.	To implement environmental sustainability efforts.	(Maliwatu, 2018)
6. Environmental concepts such as pollution prevention are widely communicated among operations at ISO 14001:2015 certified organizations.	[Do] Communicate pollution prevention.	To report and communicate ISO 14001:2015 EMS as well as its contributory function in pollution prevention.	(Maliwatu, 2018)
7. Employees have clarity regarding all operations as well as their potential improvements at ISO 14001:2015 certified organizations.	[Do] Communication for employee Awareness.	To report and communicate ISO 14001:2015 EMS as well as its contributory function in pollution prevention.	(Pesce, Critto & Marcomini 2018)

8. Targets are more clearly delineated at ISO 14001:2015 certified organizations.	[Do] Operational Efficiency management.	To initiate and implement ISO 14001:2015 goals by adhering to operational aims.	(Salim, Padfield, Hansen, Syayuti, & Papargyropoulou, 2018)
9. Continuous improvement projects are taking place at ISO 14001:2015 certified organizations.	[Check] Continuous improvement implementation.	Implementation of continuous improvement based on ISO 14001:2015.	(Pacana, 2019)
10. There is increased clarity of operational mechanisms at ISO 14001:2015 certified organizations.	[Act] Monitor Operational Efficiency.	Adoption of ISO 14001 within operational departments increasing operational efficiency.	(Salim, Padfield, Hansen, Syayuti, and Papargyropoulou, 2018)
11. Environmental Management system is regarded as preventative action.	[Act] Monitor environmental impacts.	Implement an EMS as a preventative measure to mitigate environmental impacts.	(Vermeulen, 2018)
12. The life cycle of goods manufactured at ISO 14001:2015 certified organizations are taken into consideration in ISO 14001:2015 implementation.	[Act] Monitor Environmental Protection.	Implement life cycle assessments to clarify long term production impacts.	(Aguiari et al., 2016)
13. Through the implementation of ISO 14001 company resources are better managed.	[Act] Monitor resource management.	To implement improved resource management.	(Aguiari et al., 2016)
14. Customer satisfaction is improved through ISO 14001: 2015 implementation.	[Act] Customer satisfaction.	Improve customer satisfaction through ISO 14001:2015 implementation.	(Boiral et al., 2018)
15. Financial savings are evident through the implementation of ISO 14001.	[Act] Financial savings.	Implementation of cost control measures through	(Salim, Padfield, Hansen, Syayuti, &

		the adoption of ISO 14001:2015.	Papargyropoulou, 2018)
Section B			
1. You, as a member of SHERQ management were not motivated to be a part of the implementation the ISO 14001 standard due to administrative requirements.	[Plan] Outlining human resource requirements.	Implementation of time allowances for ISO 14001:2015 implementation administration requirements.	(Waxin et al., 2019:30)
2. You lacked understanding of the requirements to comply with ISO 14001:2015 at ISO 14001:2015 certified organizations.	[Do] Ascertain employee awareness.	Practice employee training and competency assurance.	(Pesce, Critto and Marcomini ,2018)
3. Compliance to the ISO 14001 standard is a financial burden to ISO 14001:2015 certified organizations.	[Do] Implementation costs.	Increase the standard of capability of corporations to compute the "expenses" sustained to accomplish continuous improvement and preserve the EMS and the commercial "advantages", environmental and organizational produced from its application.	(Di Noia & Nicoletti, 2016).
4. There is a lack of top managerial involvement in the implementation of ISO 14001:2015 at ISO 14001:2015 certified organizations.	Top management involvement.	Implementation of increased top management involvement.	(Vermeulen, 2018)

5. The ISO 14001 certification is primarily for the upgrading of public image and there are no improvements in environmental performance.	[Act] Monitor environmental impacts.	Improve environmental performance.	(Di Noia & Nicoletti, 2016)
6. There is no consideration of environmental policy in production at ISO 14001:2015 certified organizations.	[Act] Monitor environmental impacts.	Environmental Impacts of production are considered during policy generation for production and throughout the life cycle of products.	(Vermeulen, 2018)
7. There are increased costs relating to competency training at ISO 14001:2015 certified organizations.	[Do]Implementation Costs.	Costs of ISO 14001:2015 implementation are budgeted for.	(Pesce, Critto & Marcomini, 2018)
8. Large amounts of time is required for training required for competency regarding ISO 14001 implementation.	[Act] Financial savings.	Time costs of ISO 14001:2015 implementation are budgeted for.	(Musa & Chinniah ,2016)
9. There is a lack of cooperation from colleagues at ISO 14001:2015 certified organizations.	[Do] Employee Awareness.	Employee motivation is increased through increased top management involvement.	(Pacana, 2019)
10. Product procurement is impacted on placing uncertified suppliers at a disadvantage at ISO 14001 certified organizations.	[Do] Green Supply Chain.	Procurement operation shifts to an environmentally sustainable focus.	(Diseko, 2017)
11. Time designated to the management of ISO integration complexity is limited.	[Plan] Time Costs.	Time is budgeted toward facets of ISO 14001:2015 implementation.	(Pesce, Critto & Marcomini, 2018)
12. There is a top down approach with no input utilized from employees regarding ISO 14001 implementation.	[Do]Top management involvement.	Increase in involvement of stakeholders.	(Vermeulen, 2018)

13. Maintenance costs of compliance to the standard are high.	[Plan] Financial Costs.	The increased costs of ISO 14001:2015 implementation to be offset by operational savings.	(Vermeulen, 2018)
14. External stakeholder engagement does not occur at ISO 14001:2015 certified organizations.	[Do] Stakeholder engagement.	Communication with external stakeholders is outlined as a function of ems implementation.	(Waxin et al., 2019:30)
15. Identified positive opportunities of ISO 14001 are not effectively utilized.	[Check] Continuous improvement implementation.	Effective implementation of continuous improvement opportunities are undertaken.	(Di Noia & Nicoletti, 2016).

Questions in the questionnaire were based on the KPI's denoted above. The following section of the methods will address the questionnaire design selected in order to categorically assimilate SHERQ managerial perspectives of ISO 14001:2015.

3.3.1 Questionnaire design

Figure 3.2 illustrates the key components of the questionnaire presented to survey participants.

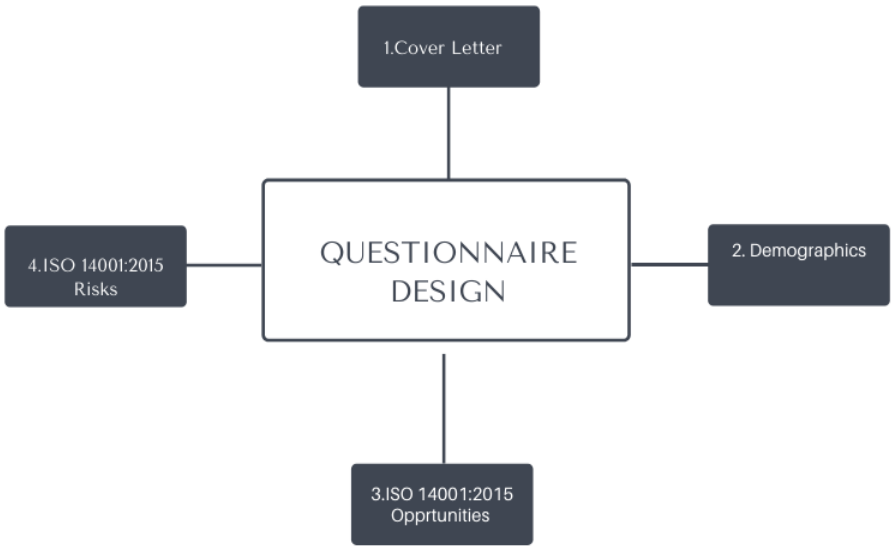

Figure 3.2: Questionnaire Design

The questionnaire comprised 3 segments (Refer to annexure A). The initial component of the questionnaire encompassed demographic data which consisted of questions that specifically addressed SHERQ managerial staff within the Durban region. Connelly (2013) stated that demographic data is primarily aimed at informing readers of the population of respondents to the questionnaire which, in this research, pertained to the variations between various participants experience, awareness and understanding of ISO 14001:2015 EMS implementation.

The questions which followed the initial segment of the questionnaire were closed-ended to support the generation of quantitative data (Choy, 2014). In segment 2 of the questionnaire, SHERQ managerial staff were asked a range of questions to obtain their perspectives of the opportunities emanating from the implementation of ISO 14001:2015. This was followed by segment 3 in which they were asked a range of questions to obtain their perspectives on the risks emanating from the implementation of ISO 14001:2015. Respondents were offered a platform within the concluding segment of the questionnaire to present additional commentary.

a. Surveillance participation accrual

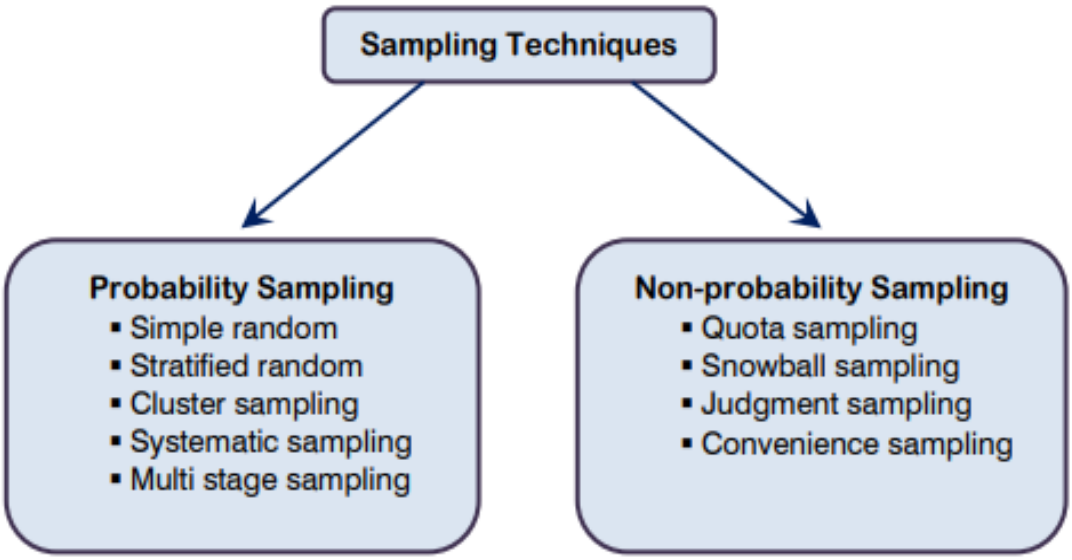

Figure 3.3: Sampling techniques (Adopted from Taherdoost, 2016).

Brown (1947) indicated that probability sampling represents the costliest sampling technique approach pertaining to the amounts of time and energy required. With regards to non-probability sampling, such studies focus on small samples with the intention of analysing real-life phenomenon which will not be utilized for the purpose of statistical inference to a wider population. However, clear reasoning is required pertaining to the inclusion of certain stakeholders and not others (Taherdoost, 2016).

Thus, this study utilized nonprobability sampling as the assessment of the opportunities and risks of ISO 14001:2015 implementation within the Durban region was a highly contextually and regionally specific study and, hence, findings were not designed for inferences onto greater populations. In addition, convenience sampling is a non-probability sampling technique which is inexpensive and selects participants based on their readiness and availability; thus, it was utilised in this study due to the nature of the studies' funding and time allocations (Taherdoost, 2016). The Durban region was additionally selected as the region of assessment primarily due to proximity, and accessibility to study participants.

b. Convenience Sampling

As mentioned above pertaining to variations in quantitative research, it would be impossible to include every member of the population being assessed as the accessible population is primarily finite (Etikan, Musa, & Alkassim, 2016). Etikan et al. (2016) described convenience sampling as non-random or non-probability sampling in which subjects within the target population meet practical criteria, these may be inclusive of suitable levels of accessibility, availability in the duration of sampling periods, geographical proximity, or the readiness and willingness to participate. Convenience sampling was used in the current research study, particularly as the advantages of convenience sampling includes affordability as well as willingly available subjects (Etikan et al., 2016). Furthermore, in accordance with the findings of Etikan et al. (2016), the convenience sampling method was adopted due to the spatial characteristics of the identified candidates pertaining to their experience within the Durban region which is the primary study location. Etikan et al. (2016) further states that convenience sampling may be undertaken when a study population is administratively available to the researcher, this was additionally why convenience sampling was adopted in this study as research participants were additionally remotely accessible via LinkedIn and email in the event of a COVID-19 pandemic induced lockdown. Vital role players in the current study were managerial staff who could successfully implement ISO 14001:2015 – these individuals were situated within the arena of safety, health, environmental, risk and quality control (SHERQ) (Chiarini, 2019). However, Etikan et al. (2016) identified weaknesses of convenience sampling as the lack of quantification of biases as well as the possibility of the presence of outliers misrepresenting the sample.

SHERQ managerial staff (who play a pivotal role in ISO 14001:2015 implementation in the Durban region) were identified for inclusion in the current study as part of a convenience sampling cohort.

Due to the non-disclosure policy of certain companies, the total population of SHERQ managers within the Durban region comprisal is largely unknown. Nonetheless, convenience sampling was used to obtain responses to the questionnaire to ensure valid findings aligned with SHERQ managers from the

Durban region who were prepared to partake within the research and were approached within the study time frame.

Segment 2 and 3 of the questionnaire explored the identification of risks and opportunities surrounding ISO 14001:2015 implementation from a uniquely SHERQ managerial perspective.

The questionnaire consisted of questions pertaining to risks and opportunities identified in the framework and were evaluated by means of assigning Likert scale responses from: 7 - meaning strongly agree to 1 - meaning unable to judge.

The Likert scale has been extensively utilized academically for the purpose of analysing opinions and views (Boone & Boone, 2012) and is defined as a psychometric scale which has various categories from which questionnaire participants select to indicate their perspectives pertaining to a certain matter (Nemoto & Beglar, 2014). Furthermore, Likert questionnaires have been most frequently utilized for assessments of distinct difference variables such as confidence and motivation (Nemoto & Beglar, 2014). The analysis of Likert data is undertaken by utilizing interval measurements which are the recommended descriptive statistics and are inclusive of standard deviations for variability as well as the mean for central tendency (Boone & Boone, 2012). The primary caveat with Likert data is the limited count of responses within each category (Chimi & Russell, 2009). The consequent analysis is thus limited. However, Nemoto and Beglar (2014) enlisted the following advantages of utilizing Likert scales:

(a) Data can be assimilated from large groups of study participants relatively quickly.

(b) The cogency of the interpretations emanating from the data collected can be established through various means.

(c) Likert scale questionnaires data can be compared, as well as combined with qualitative data-gathering procedures, inclusive of participant observation, open ended questions in conjunction with interviews for the purpose of possible future studies to be undertaken utilizing the findings of this study as a premise.

3.3.2 Research limitations and trustworthiness of data

Identification of limitations is important as it demonstrates rigour in addition to creating the opportunity to clarify directives for studies to be undertaken in the future (Greener, 2018).

The impediments encompassing time constraints, questionnaires response periods as well as confidentiality were acknowledged through the entirety of the study thus ensuring that each obstacle was addressed accordingly through the utilization of stringent planning protocols, thorough and consistent engagement with SHERQ management and relaying of anonymity. According to Brink (1993) trustworthiness of data emanating from research stems from validity and reliability of the research. Kumar and Muthu (2020) stated that research validity is dependent on the appropriateness of the research methodology.

Brown (2016) stated that ascertaining cogency of literature analysis needs to encompass purpose and format as well as audience. These factors were considered throughout the extensive literature review undertaken. Golafshani (2003) additionally posits that two distinct features of validity occur, which are external validity as well as internal validity.

Internal validity addresses whether the research structure, analysis and conduct respond to the research questions without bias contrasting external validity in which it addresses whether the research findings may be generalized to other contexts applicable to entities which are beyond the study sample (Andrade, 2018).

(a) Internal and external cogency of the study design

The researcher directly involved in the current study requested Crombach Alpha for use within SPSS to ensure valid findings. Crombach alpha aids in the facilitation of reliability estimation (Yilmaz, 2013). Ethical clearance was requested in order to further ensure the overall validity of the research.

(b) Validity and dependability of data gathering instrument in this research

An extensive self-conducted literature review was used as the basis of an evaluation framework upon which the questionnaire was based, thus ensuring its validity and reliability (Yilmaz, 2013).

3.3.3 Questionnaire distribution

Kumar and Muthu (2020) stated that a questionnaire encompasses questions regarding an inquiry pertaining to a study for which the researcher requires answers. Respondents were made aware of their option to remain anonymous (Wiles et al., 2008) before being issued with the questionnaires. Due to its limited duration and quantitative nature, this research necessitated primarily closed-ended questions which were determined by the scope of the questionnaire dictated by the literature review. 62 Participants were supplied with the questionnaires via email and via LinkedIn.

Phase Three

Phase 3 of the study was primarily linked to the statistical assessment of the data collected via the questionnaires. Initially the data collected via questionnaires were captured onto an Excel spreadsheet. Thereafter, the spreadsheet was analyzed by an independently sourced statistical agent: Afregarde Editlink Statistician specialists. This was followed by the findings then being presented in graphs to allow their effective communication. The graphs were then followed by an explanatory analysis in order to provide clarification in assessing the prevailing opportunities and risks of ISO 14001:2015 from the perspective of SHERQ managerial staff in the Durban region for the purpose of communicating probable avenues for continuous improvement. The above-mentioned findings were thereafter compared to international and national studies (e.g. Vermeulen, 2018 etc) previously established from the extensive literature review in phase 1 of the research.

The illustration below summaries the steps of the statistical examination carried out by Afregarde Editlink Statistician specialists.

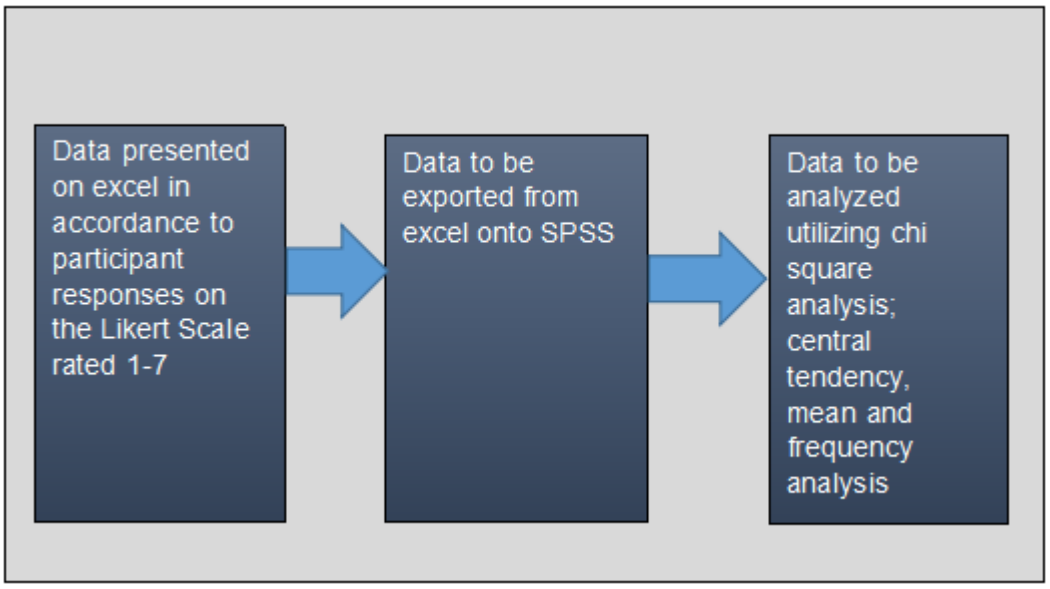

Figure 3.4: Data analysis procedure

Data was initially assessed utilizing central tendency measures such as mean, median and standard deviation. This was assimilated from recording the frequencies of responses ranging from 1 to 7 i.e. from “unable to judge” to “strongly agree” to each of the 30 perspective questions as per the evaluation framework in the questionnaire and the four demographic questions presented to each study respondent in the questionnaire. The standard deviations showing the “distance” of values from the mean were thereby determined from the raw data (raw data encompassed frequencies of respondent responses to risks and opportunities).

Thereafter, Kurtosis (assessment for extreme values/outliers) and skewness measures between -3.0 and 3.0. were utilized to analyse normality (likeliness of a random variable to be distributed “normally” within the raw data) and whether or not mean scores should be utilized (McDonald, 2020). A Likert scale from 1 to 7 was used to interpret mean and median scores with means ranging from 1 to 7 corresponding to the Likert scale options provided to respondents in the questionnaires. These ranged from “unable to judge” - 1, “strongly disagree” - 2, “disagree” - 3, “partly disagree” - 4, “partly agree” - 5, “agree” - 6 and “strongly agree” - 7. Fisher’s exact tests were then undertaken in order to test for associations between a respondent’s department and competence training on one hand, and the 30 views that were presented to respondents for

rating on the other. Cramer's V test was used as a *post hoc* test for Fisher's exact tests for measuring the strength of all statistically significant associations. A probability p-value of 0.05 was utilized in order to ascertain statistical significance (McDonald, 2020). Lastly, Pearson correlations were applied to assess for associations between the percentage of time one spent on ISO-related activities and their perception on the 30 presented views. These statistical measures and tests are detailed in Chapter 4.

Table 3: Suggested data analysis procedures for Likert-Type and Likert Scale data (Adopted from Joshi, Kale, Chandel and Pal, 2015)

Statistical Examination	Likert-Type Data	Likert Scale Data
Central Tendency	Median or mode	Mean
Variability	Frequencies	Standard deviation
Associations	Kendall tau B or C	Pearson's r
Other Statistics	Chi-square	ANOVA, t-test, regression

3.3.4 Quantitative statistical procedures summary (McDonald, 2020)

- Raw data from questionnaire responses were presented onto Excel in accordance to the Likert Scale rated 1-7
- Data was exported from Excel onto SPSS
- Data was analysed utilizing chi square analysis, central tendency, mean and frequency analysis. The mean ranged from 1 to 7 (unable to judge to strongly agree)
- Fishers exact tests were undertaken to assess if the differences in responses were due to the respondents or were random. p (probability) values < and equal to 0.05 indicated significance.
- Crammers V tests showed if the above-mentioned Fishers exact tests significance was low or high (scale 1 to 0).
- Pearsons Corrolations tests were then done lastly to assess if variables were significantly related or not with a scale ranging from (-1 to 1).

3.3.5 Descriptive statistics summary

Descriptive statistics entailed testing for descriptive statistical facets of the questionnaire responses, i.e., testing for the frequencies of responses in the sample (i.e. how many participants reported which responses regarding each statement presented in the questionnaire).

- Frequencies and mean scores of all Likert scales were measured

3.3.6 Inferential statistics summary

Tests for association between department, years at respective organizations, time spent on ISO training and ISO training time allocation as well as Likert scale responses were conducted, Chi square tests of association were carried out, i.e. the following are independent variables for chi square analysis

1. Which department do you work at in your organization?

2. For how many years have you worked in your department?

3. Approximately how much of your working time do you spend directly on ISO 14001 related activities?

4. Have you received any competency training on the ISO 14001:2015 standard?

The Likert scale questions were the dependant variables propositioning that the sample responses had linkages to employee experience. The findings of the examination of the statistical data generated in this study were displayed using graphs and explained according to findings in chapter 4.

3.4 Ethical considerations

According to Arifin (2018) the quantitative researcher is responsible for ensuring the freedom of choice for survey participants to participate in a study. Furthermore, Arifin (2018) states that the researcher is accountable for the identity protection of research participants throughout the dissemination as well as recruitment procedures within a study to ensure honest and transparent reporting of findings. Taking the aforementioned into consideration in conjunction with the required ethical practices of UNISA, the researcher ensured the required ethical considerations were adhered to.

The primary ethical considerations which were issued encompassed willingness to participate in the study as well as anonymity. To undertake the aforementioned, permission to participate in the study was requested upon initial contact with all potential participants, this was documented through consent forms which additionally elaborated on the purpose of the study to ensure participants understood their pertinent role in the research. Furthermore, no confidential data such as identification numbers or addresses were solicitated from any questionnaire respondents. Participants were additionally issued with the researchers contact details in order for them to access the researcher for any forms of clarification required regarding the study.

All data provided by participants were dealt with confidentiality and the email address to which participants had sent their questionnaire responses to was password protected. Furthermore, primary raw data was processed and analysed on a password protected laptop (Arifin, 2018).

The researcher ensured that all reach participants understood the nature and value of the study being conducted through a cover letter issued to all questionnaire participants on the first page of the questionnaire document. A high level of professionalism, transparency and respectful conduct was adopted throughout the study. Taking the abovementioned into consideration, UNISA had issued Ethical approval (UNISA Ethical Clearance Reference:

2019/CAES_HREC/185). Research participants were individually approached and were issued with individual consent documentation, which received all participants approval.

Chapter 4: Results and Discussion

4.1 Introduction

Chapter 4 addresses objective 3 of the study, to analyse SHERQ managerial responses to the ISO 14001:2015 implementation risks and opportunities within the Durban region. In conjunction with the aforesaid, Chapter 4 illustrates results assimilated from data assembled from the questionnaires which were issued to respondents.

A total of 42 questionnaire participants responded to the questionnaire in which their perspectives on the opportunities and risks in ISO 14001:2015 implementation was recorded by means of questions with pre-determined Likert scale options. The study findings are shown in the following Results section initially by means of pie charts as well as bar graphs. These were followed by interpretations derived from the statistical data relative to opportunities and risks of ISO 14001:2015 implementation from unique perspectives sourced from SHERQ managers in Durban.

4.2 Sample description

Table 4 below illustrates the sample (n=42) and sample's characteristics.

4.2.1 Sample assessment

There were initially 4 demographic questions in part 1 of the questionnaire, followed by 15 questions in part 2 section A regarding ISO 14001:2015 opportunities and 15 questions in part 2 section B regarding ISO 14001:2015 implementation risks. In part 1, the respondents were asked which department they worked in initially. The aforementioned served as a confirmation of the target audience, which was aimed at SHERQ managers essentially. A minority of questionnaire participants also served within alternate arenas within their respective companies such as operations management and general management while additionally assuming their role as SHERQ managers within their respective companies.

The figure below illustrates the participants who were solely SHERQ managers as well as participants who assumed the role of SHERQ managers in addition to other operational management and general management roles within their companies.

Table 4: Sample description

Variable	Response	Frequency	Percent
Department	SHERQ	34	80,9%
	General Management	2	4,8%
	Operations Management	6	14,3%
Total		**42**	**100%**
Duration in Department	0-5 years	15	35,7%
	6-10 years	13	31,0%
	11-15 years	7	16,7%
	16-20 years	4	9,5%
	Over 20 years	3	7,1%
Total		**42**	**100%**
% of time spent working on ISO-related activities	None	4	9,5%
	Up to 25%	18	42,9%
	26-50%	8	19,0%
	51-75%	5	11,9%
	76-100%	7	16,7%
Total		**42**	**100%**
Competency training on ISO 14001 received	No	8	19,0%
	Yes	34	81,0%
Total		**42**	**100%**

Table 4 shows a summation of the variables to be utilized within the following Fishers exact tests and Pearson's correlations.

Figure 4.1 illustrates the numbers of respondents per department of employment, further detailed below.

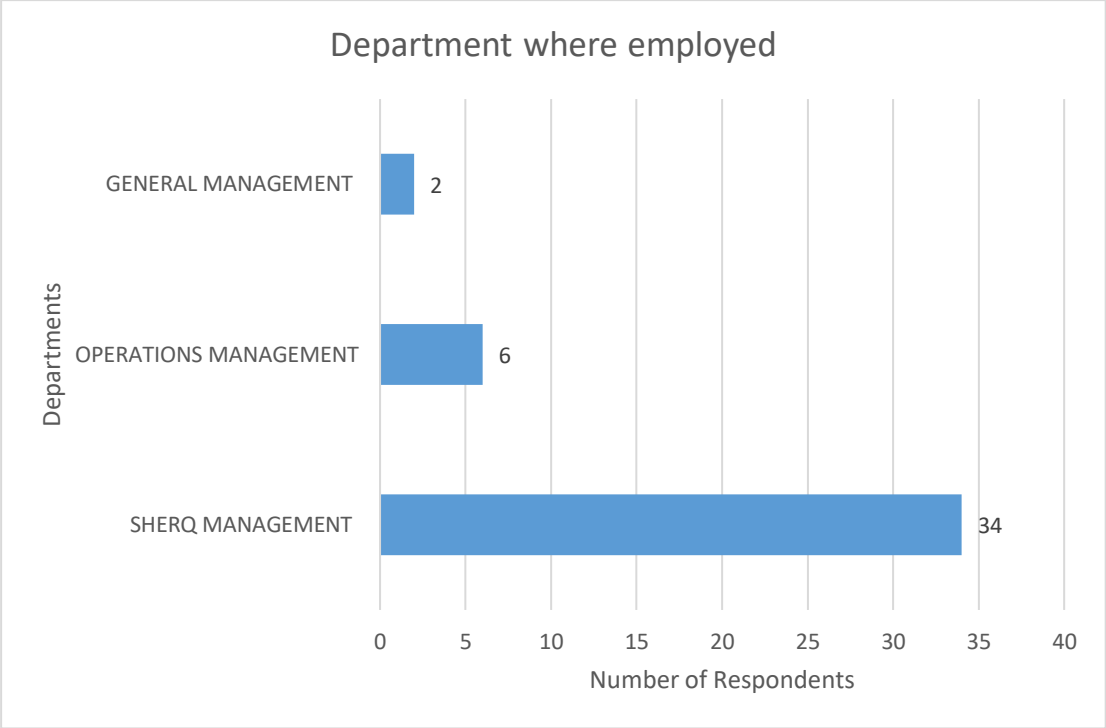

Figure 4.1: Department of employment of respondents

The figure 4.1 above illustrates the questionnaire was principally disseminated to SHERQ management employees whose opinions were reflected in the results which follow. The operational management and general managerial staff surveyed additionally did hold SHERQ managerial roles, however this was accompanied by general administrative, managerial and operational management functions, and so they were grouped separately despite their opinions still being reflective of that of a SHERQ manager.

Figure 4.2. below demonstrates the demographic data assessment pertaining to the experience of SHERQ managers in the Durban region. The primary aim of ascertaining the number of years of experience per questionnaire respondent was to support the validity of each respondent's responses concerning the opportunities and risks in ISO 14001:2015 implementation.

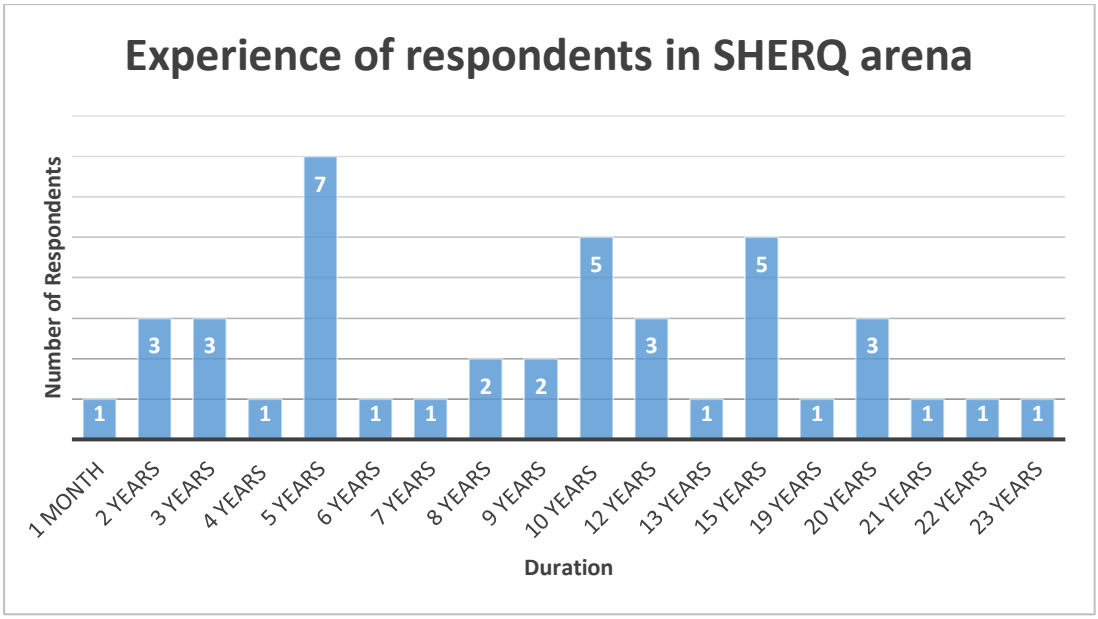

Figure 4.2: Experience of respondents in the SHERQ arena

There were 4 respondents (9.5%) who had 15-20 years of experience while 3 (7.1%) had over 20 years of experience. A total of 27 respondents (64.3%) had over 5 years of SHERQ managerial experience. Thus, most respondents had a significant amount of experience within the SHERQ managerial arena and this supports the reliability of their perspectives pertaining to ISO 14001:2015 implementation risks and benefits in the Durban region. This also indicated their potential competency at a top managerial level regarding their potential to efficiently allocate resources and manage risk mitigation concerning environmental issues (Sennoga & Ahmed, 2020).

The third question in part 1 of the questionnaire addressed how much time respondents spent on the implementation of ISO 14001:2015 activities in their positions.

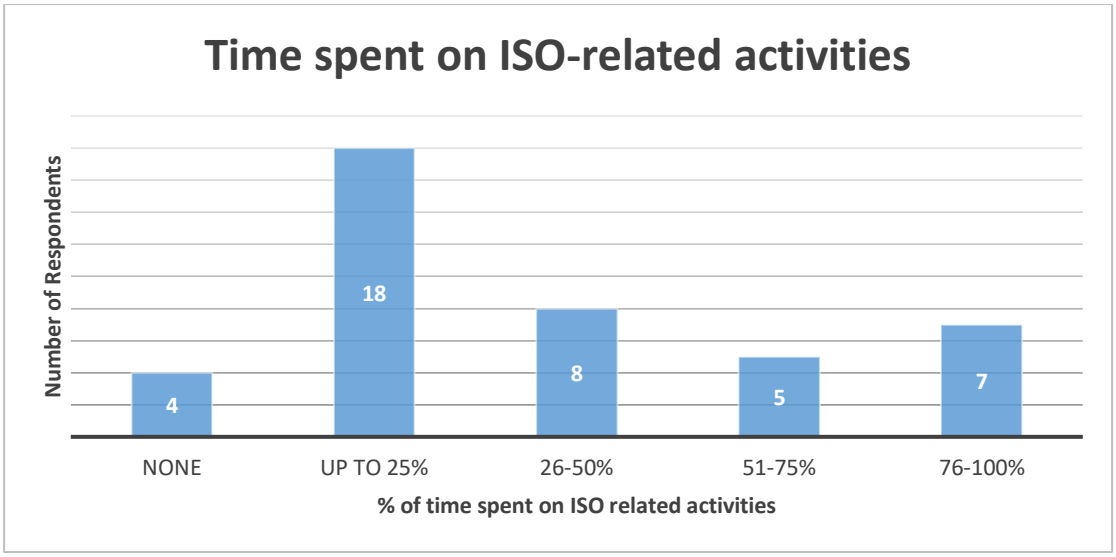

Figure 4.3: Percentage of time spent working on ISO-related activities

From a total of 42 respondents, 18 (42%) of the participants spent up to 25% of their time at work dedicated to ISO-related activities. Alarmingly, there were four respondents who spent no time on ISO undertakings. This was especially concerning as this supported one of the primary risks of ISO 14001 implementation which was identified as lack of managerial commitment to ISO 14001 implementation (Vermeulen, 2018).

The fourth question of the questionnaire addressed whether the respondents received competency training pertaining to the implementation of ISO 14001.

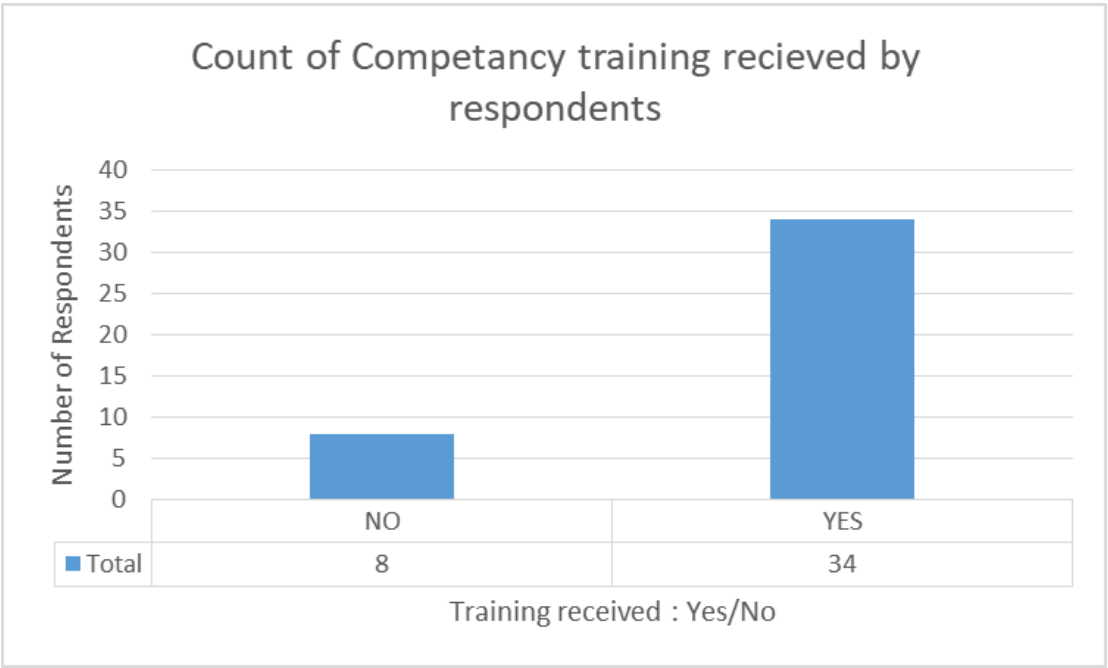

Figure 4.4: Count of competency training received by respondents.

Most respondents had awareness as well as competency training this was represented by 34 respondents (80.9%) -pertaining to the 2015 version of ISO 14001. Thus, as 8 respondents (19%) hadn't been trained relating to the implementation of ISO 14001:2015, this was particularly problematic due to the important role of competency within the parameters of ISO 14001 implementation (Sennoga & Ahmed, 2020). Impediments to training identified by Sennoga and Ahmed (2020) were inclusive of poor management commitment levels. This echoes the findings of Figure 4.2 in which certain managerial members of staff had spent no time on ISO-related activities. Furthermore, Sennoga and Ahmed (2020) cited organizational cultures in addition to high training costs, training time expenses and proficiency in delivering environmental training as potential impediments to ISO training. A vast majority, representing 34 respondents (80.9%), had received competency training on ISO 14001, which was a positive indicator of potential competency. Fisher's Exact (Fe) tests which test for associations of variables were further conducted to assess if there was any association between the duration one had worked in a department and whether they had received competency testing on ISO14001 or not (Fishers exact tests results are illustrated in table 10). There was no statistically significant ($Fe<0.005$ indicates significance) association between duration in the department and whether one had received competency testing on ISO14001 or not ($Fe=2.81$). Thus, the differences in competency training by duration in the department observed in the data were random and did not stem from any systematic variations.

The following section describes some of the findings of assessment of the descriptive data sourced for the study from the questionnaires.

4.3 Descriptive data analysis

Descriptive data analysis consisted of central tendency tests and frequency analysis utilizing tables and graphs.

Table 5 reflects the respondents' opinions regarding opportunities associated with the adoption of ISO 14001:2015 which enables achieving objective 3 of the study addressing the analysis of SHERQ managerial responses to the ISO

14001:2015 implementation risks and opportunities within the Durban region. The parameters for table 5 were outlined in the data analysis section of Chapter 3.

Table 5: Analysis of Likert scores of Part 2 of the study questionnaire

Statement	N	Mean	Med.	Std. Dev	Skew	Kurtosis
1.The increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement.	42	6,3	7	1,1	-3,3	13,6
2.The company you are employed by meets community and public expectations regarding environmental performance.	42	6,2	6	1,1	-2,8	11,7
3.There are increased investor inputs.	42	5,0	6	2,0	-1,1	-0,1
4.Top management implement proactive environmental measures.	42	6,1	6	0,9	-0,6	-0,6
5.Employees are better committed to environmental sustainability.	42	5,8	6	0,8	-1,1	2,8
6.Environmental concepts such as pollution prevention are widely communicated among operations.	42	6,2	6	0,8	-0,8	0,0
7.Employees have clarity regarding all operations as well as their potential improvements.	42	5,8	6	1,1	-1,4	3,2
8.Targets are more clearly delineated.	42	5,8	6	1,2	-1,9	5,6
9.Continutions improvement projects are taking place.	42	6,0	6	1,3	-2,0	4,9
10.Increased clarity of operational mechanisms is evident.	42	5,8	6	1,2	-1,8	5,5
11.Environmental Management systems are regarded as preventative action.	42	5,9	6	0,9	-1,2	2,4
12.The Life cycle of goods manufactured are taken into consideration.	42	5,4	6	2,0	-1,4	0,6
13.Through the implementation of ISO 14001 company resources are better managed.	42	5,8	6	1,4	-2,2	5,6

14.Customer satisfaction is improved.	42	5,8	6	1,5	-2,5	6,1
15.Financial savings are evident through the implementation of ISO 14001.	42	5,3	6	1,9	-1,4	1,0

Results suggest that all the participants agreed that adoption of ISO 14001:2015 was associated with good management practice, improved employee morale and communication, investor and customer satisfaction as well as improved education, clarity, and proactivity regarding environmental issues.

4.3.1 Questionnaire response analysis Part 2 Section A

According to Da Fonseca (2015) top management involvement has a significant impact on leadership improvement. Figure 4.5 shows participants responses to the statement: “Increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement”.

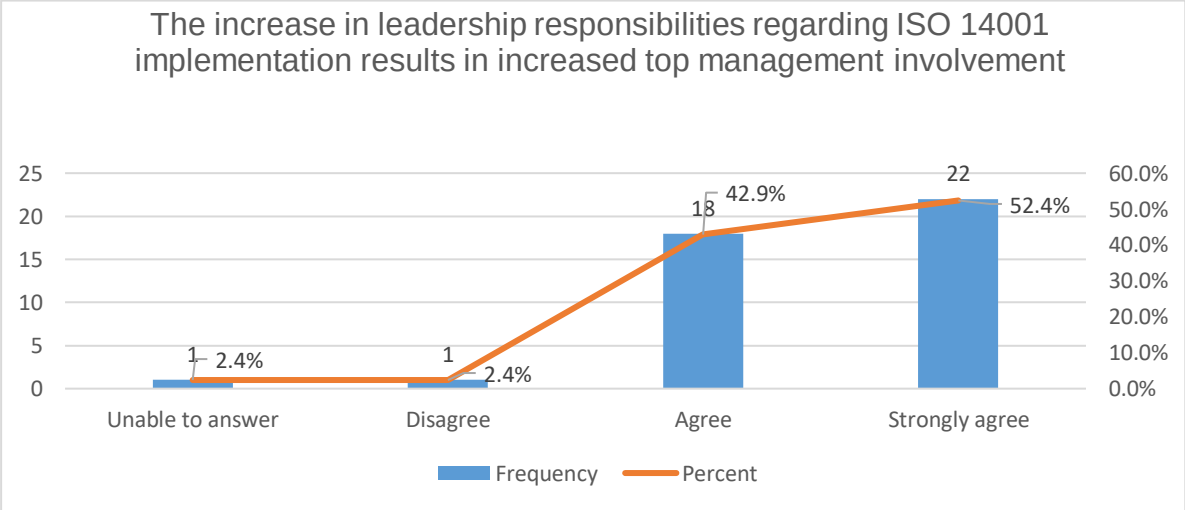

Figure 4.5: Increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement

Figure 4.5 Interpretation: Figure 4.5 shows that 22 respondents (52.4%) of all surveyed respondents strongly agree while another 18 respondents (42.9%) agreed that an increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement. Only 2,4% of respondents disagreed. In accordance with this assertion, Vermeulen (2018)

stated that ISO 14001-certified organizations perceived top managerial participation as a chief opportunity within successful implementation of ISO 14001:2015. The median for the statement "*The increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement''* was 7 indicating the respondent's general tendency to strongly agree with the statement.

An ISO 14001:2015 certified organization may potentially meet public expectations regarding environmental performance when ISO 14001:2015 requirements are adhered to (ISO, 2015a). Figure 4.6 illustrates responses to the statement "The company which you are employed by meets community and public expectations regarding environmental performance."

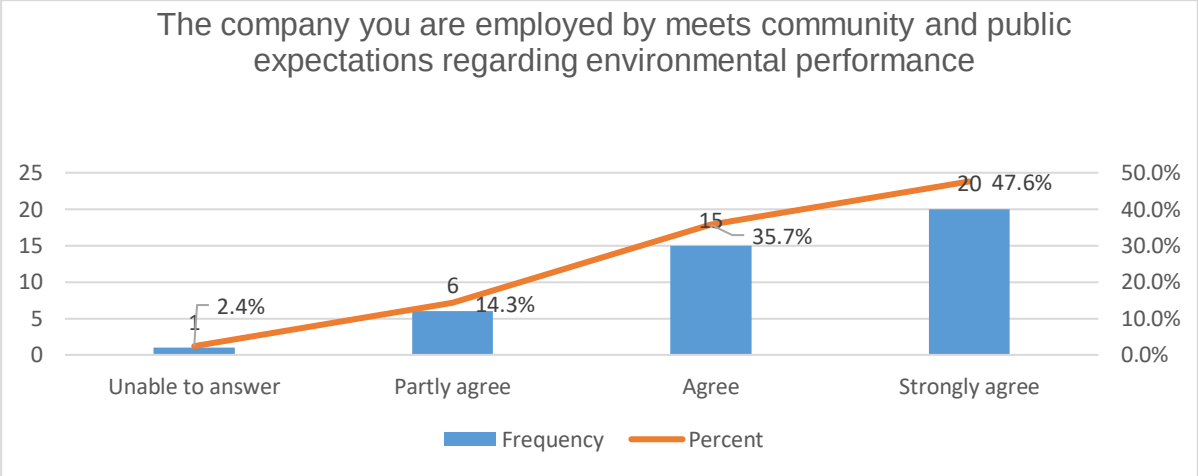

Figure 4.6: The company which you are employed by meets community and public expectations regarding environmental performance.

Regarding Figure 4.6 that reflects the respondent's feelings as to their company of employment meeting community and public expectations regarding environmental performance, 20 respondents (47.6%) strongly agreed with the statement "*The company you are employed by meets community and public expectations regarding environmental performance*'' while another third of respondents (35.7%) agreed with this statement. Only 6 respondents (14.3%) were in partial agreement to this statement and a single respondent did not answer the question. For the statement "*The company you are employed by meets community and public expectations regarding environmental performance''*, the median was 6 showing that respondents generally agreed with this view. This is an opportunity pertaining to organizational culture and the

potential to further implement future environmental proactive measures coinciding with the findings of El-Kassar and Singh (2018). In contrast, Pesce (2018) highlighted the lack of exhaustive guidelines pertaining to environmental impact prevention as a weakness of ISO 14001 performance regarding the environment.

Musa and Chinniah (2016) illustrate the pertinence of investor inputs for continuous improvement in their study. Figure 4.7 illustrates participants responses to increased investor inputs through ISO 14001:2015 implementation.

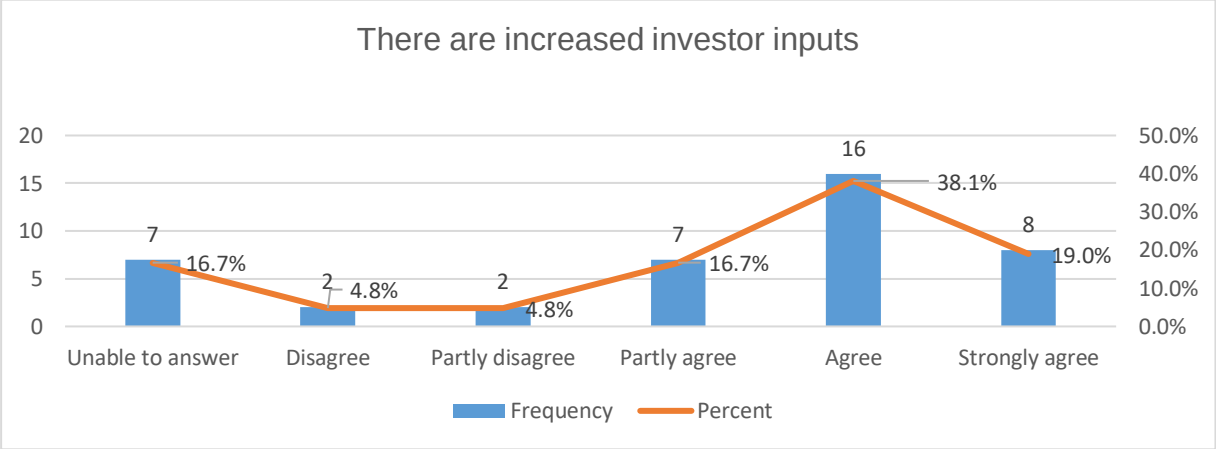

Figure 4.7: Responses to increased investor inputs.

Investor inputs are an essential facet of ISO 14001 implementation due to the implementation administrative costs of compliance to the standard. Investor inputs can be defined as "contributions encompassing financial resources such as investments, funding and revenues which are incorporated into the business''. Figure 4.7 shows responses to the statement "*There are increased investor inputs",* obtaining a mean score of 5.5 (SD=+/-2) that showed that on average, that the respondents had a proclivity to agree with this view.

Out of 42 respondents, 31 respondents (73%) agreed with this statement so that 16 respondents (38.1%) agreed, 8 respondents (19%) strongly agreed and 7 respondents (16.7%) partially agreed with the view. A considerable proportion - 7 respondents (16.7%) were unable to answer. This result suggests an opportunity in terms of a motivational factor for uncertified organizations with cost concerns to potentially pursue certification.

The following Figure 4.8 illustrates respondents' responses to the statement "*Top management implement proactive environmental measures"* to show a mean score of 6.1, (SD=+/-0.9). On average, the respondents were therefore agreeable that top management proactively implemented environmental measures.

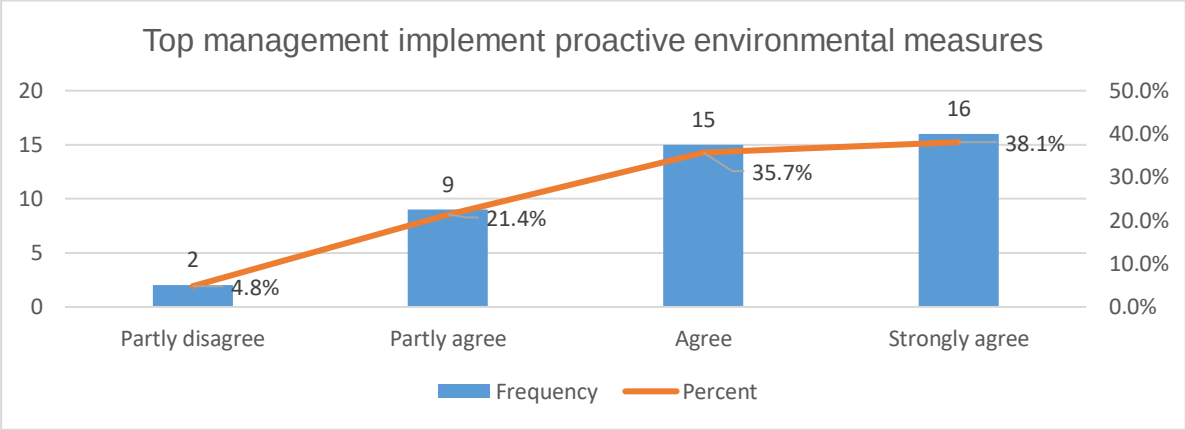

Figure 4.8: Top management implement proactive environmental measures.

As shown in Figure 4.8, from the sample of 42, 16 respondents (38.1%) strongly agreed and 15 respondents (35.7%) agreed that "*top management implemented proactive environmental measures".* No respondent in the sample disagreed with this view. According to Vermeulen (2018) top management will be further integrated into the addressing of environmental opportunities and risks through being at the centre of decision and policy making respectively pertaining to EMSs. Only 4.8% of survey participants partly disagreed with the statement that the implementation of ISO 14001:2015 coincides with top management implementing proactive environmental measures. This further illustrates a potential positive correlation pattern showing a potential link to increased top management involvement shown in Figure 4.5 reflecting top management implementation of protective environmental measures.

According to Maliwatu (2018) employees at ISO 14001:2015 certified organizations are better committed to environmental sustainability. Figure 4.9 shows the responses to the statement "*Employees are better committed to environmental sustainability*".

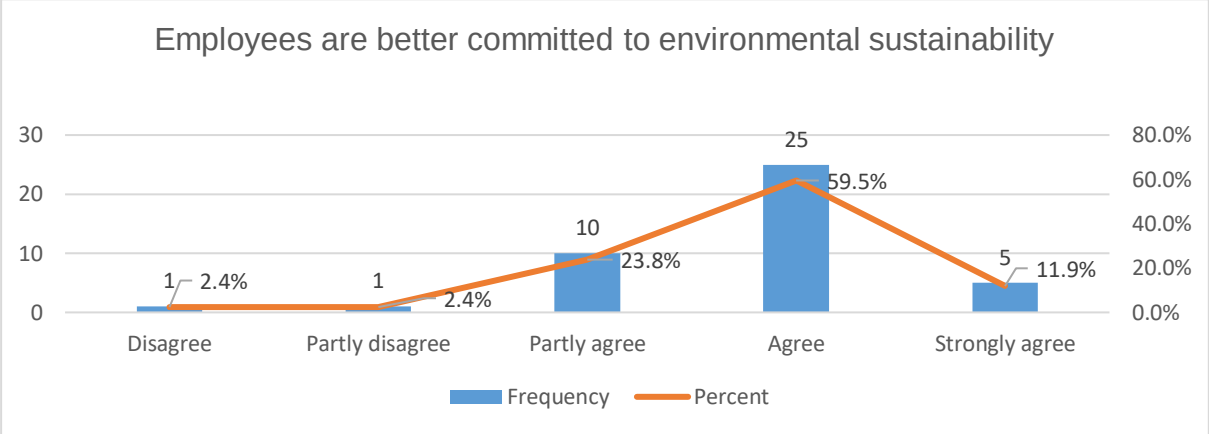

Figure 4.9: Employees are better committed to environmental sustainability

Of the 42 respondents, a small proportion of 5 respondents (11.9%) strongly agreed while 25 respondents (59.5%) agreed and nearly a quarter of respondents- 10 respondents (23.8%) partly agreed with this view. Only 1 respondent (2,4%) disagreed with this view. This shows that the respondents agreed with the view that employees are better committed to environmental sustainability in light of the implementation of ISO 14001:2015. The sample showed an overall mean score of 5.8 (SD=+/-0.8). As mentioned above, Figure 4.9 shows only 1 respondent (2.4%) indicated disagreement to employee's betterment of environmental sustainability commitment. This reconciles with the conclusions presented by Johnson (2018) which highlighted ISO 14001 and its implementation resultant in increased responsibility pertaining to environmental concerns by employees.

Figure 4.10 Interpretation: Pollution prevention is defined as an approach which is intended for the decrease of the amount of waste generated and emitted into the environment from industrial facilities, agriculture, and consumers (Environmental Protection Agency, 2020). Figure 4.10 shows responses to the statement “Environmental concepts such as pollution prevention are widely communicated among operations.”

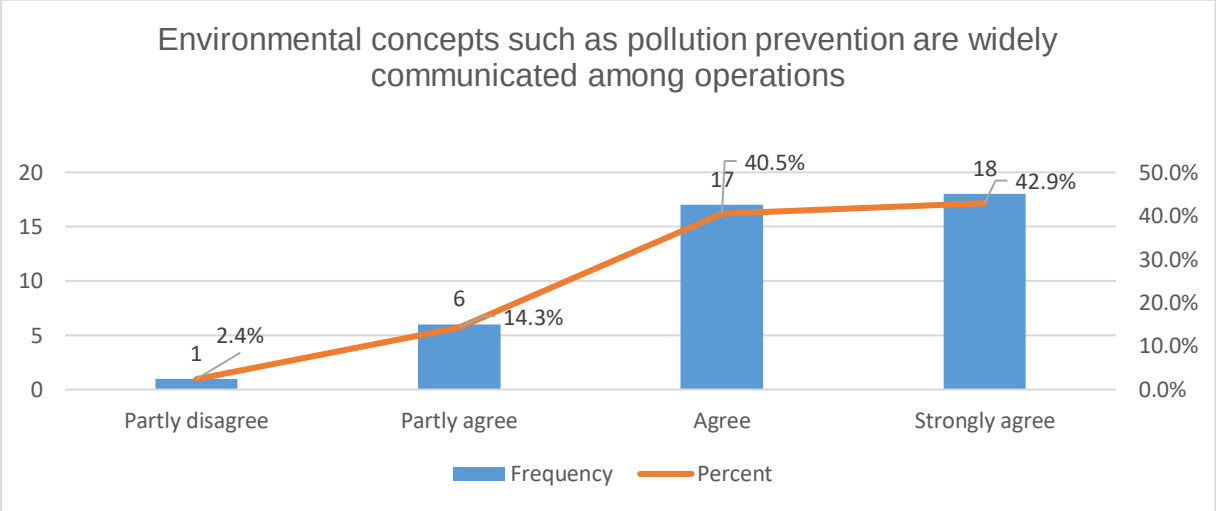

Figure 4.10: Environmental concepts such as pollution prevention are widely communicated among operations.

An overwhelming 35 respondents (84%) agreed and strongly agreed that the integration of ISO 14001:2015 played a role in environmental concepts such as pollution prevention being communicated among operations. This is a key factor as one of the opportunities of ISO 14001:2015 implementation is the communication and understanding of concepts such as pollution prevention that can be instrumental in environmental preservation. In keeping with these environmental concepts, Figure 4.10 also shows that no participants were in disagreement with the communications of environmental concepts through ISO 14001:2015 implementation. The mean score for the statement “*Environmental concepts such as pollution prevention are widely communicated among operations”,* was 6.2 (SD=+/-0.8) as illustrated in table 5 showing a tendency of general agreeability with the statement.

Pesce, Critto and Marcomini (2018) reported that employees at ISO 14001:2015 certified organizations stated they had improved clarity regarding organizational operations. Figure 4.11 shows responses to the statement "Employees have clarity regarding all operations as well as their potential improvements".

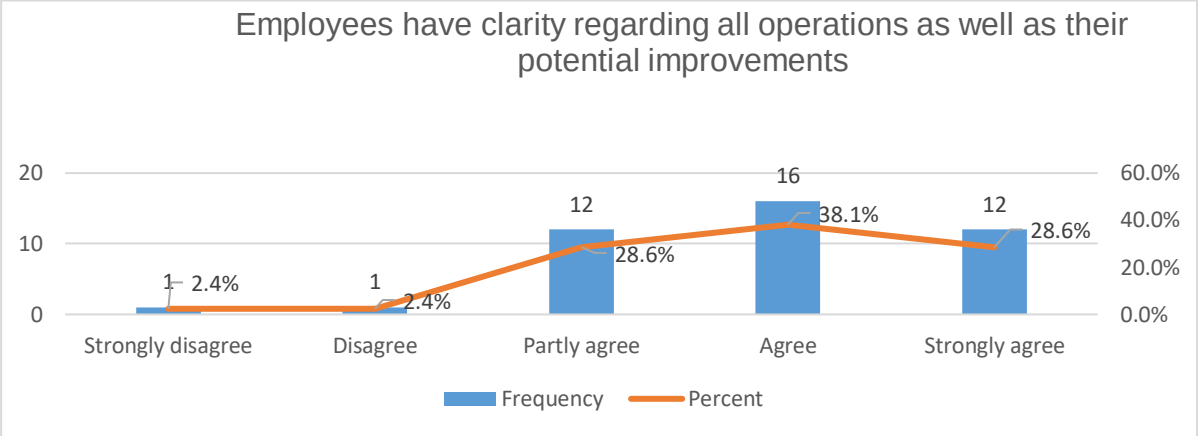

Figure 4.11: Employees have clarity regarding all operations as well as their potential improvements.

As illustrated in Figure 4.11, virtually all the participants agreed with the statement that "*employees have clarity regarding all operations as well as their potential improvements*". Of these, 16 respondents (38.1%) agreed with the statement while 12 respondents (28.6%) and another 12 respondents (28.6%) partly agreed and strongly agreed, respectively. The group was therefore convinced that employees at their organisations had clarity regarding all operations as well as their potential improvements considering the implementation of ISO 14001:2015. This further represents a relatively concentrated response indicating an opportunity within the streamlining of operations through the implementation of ISO 14001 through employees. This is evidence of positive employee participation levels pertaining to ISO 14001:2015 as Chen (2020) specifies that an absence of employee involvement is a challenge in ISO 14001:2015 implementation.

Salim et al. (2018) suggested that target delineation is aligned with operational efficiency. Figure 4.12 shows responses to the statement “Targets are more clearly delineated.”

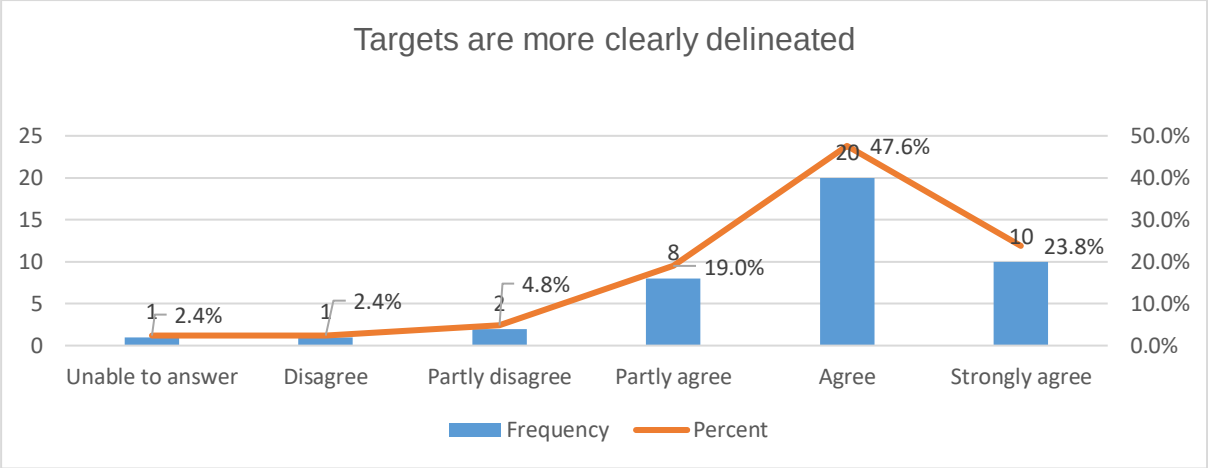

Figure 4.12: Targets are more clearly delineated.

The median for the statement “*Targets are more clearly delineated*” was 6. According to Figure 4.12, 30 respondents (71.4%) of all survey participants either agree or strongly agree that the implementation of ISO 14001:2015 is instrumental in organizational targets being more clearly delineated. This represents most of the surveyed participants and provides evidence of this being a distinct opportunity for ISO 14001:2015 implementation. This result supports the findings of Da Fonseca (2015) suggesting that ISO 14001:2015 implementation more clearly delineated work targets and was key in terms of achieving strategic targets and objectives of organizations.

Continuous improvement is regarded as a constant effort to advance operational procedures, goods and services (ISO, 2015). Figure 4.13 shows responses to the statement ”Continuous improvement projects are taking place.”

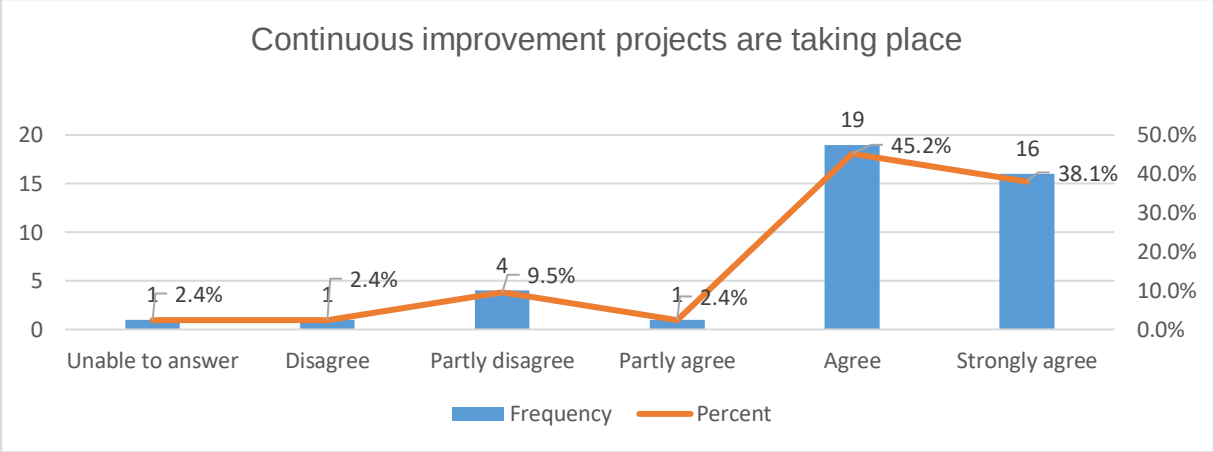

Figure 4.13: Continuous improvement projects are taking place.

The sample of respondents was, on average, agreeable that *“Continuous improvement projects are taking place”* showed further by the mean of 6 and SD=+/-1,3. As shown in Figure 4.13, most- 35 respondents (83.3%) of all participants either agreed or strongly agreed that continuous improvement projects are taking place but 7 of the respondents (17%) partly agreed or partly disagreed, disagreed or were unable to respond to the statement. Continuous improvement in accordance to ISO 14001:2015 revision is regarded as a primary principle and a necessary ongoing process to upgrade performance levels. (ISO, 2015).

Salim et al. (2018) further suggest that ISO 14001:2015 certified organizations operate with increased clarity regarding their operational mechanisms. Figure 4.14 shows responses to the statement “Increased clarity of operational mechanisms is evident”

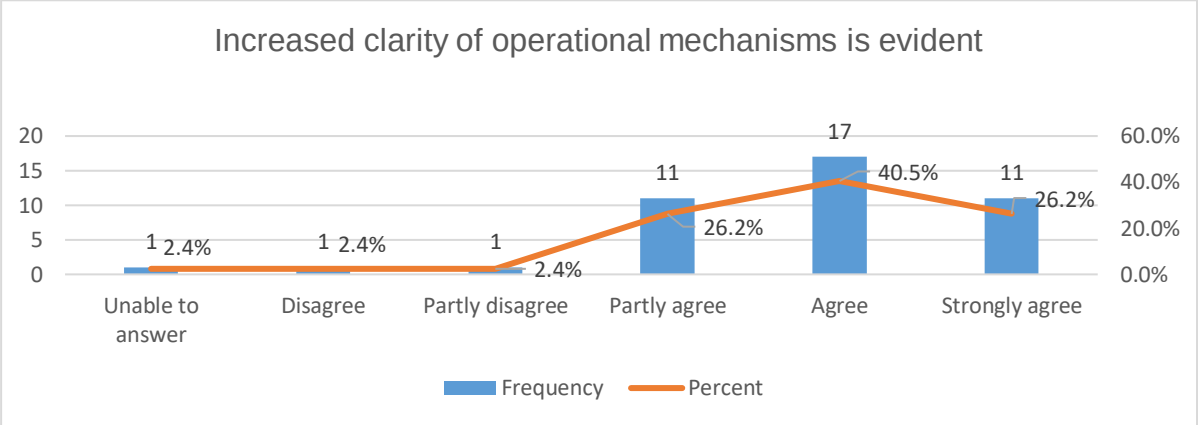

Figure 4.14: Increased clarity of operational mechanisms is evident

In response to the statement that “*Increased clarity of operational mechanisms is evident*”, Figure 4.14 indicates 28 respondents (66.7%) of all survey participants agree and strongly agree that the implementation of ISO 14001:2015 is key in terms of the increase in clarity pertaining to operational mechanisms within an organization. The median for this statement was 6 according to table 5 above, showing that the group had a stronger tendency towards agreeing with this statement. This confirmed the finding of Ivanova and Haradinova (2020) in their study which focused on the motivations and profits of EMS thereby stating that a positive correlation between decision-making favouring certification and as well as vital facets inclusive of experience regarding heterogeneous teams within organizations and organizational turnover of services and goods for final consumption purposes exists.

Vermuelen (2018) suggested that environmental management systems can be contributors toward preventative environmental action. Figure 4.15 shows responses to the statement “Environmental Management systems are regarded as preventative action”

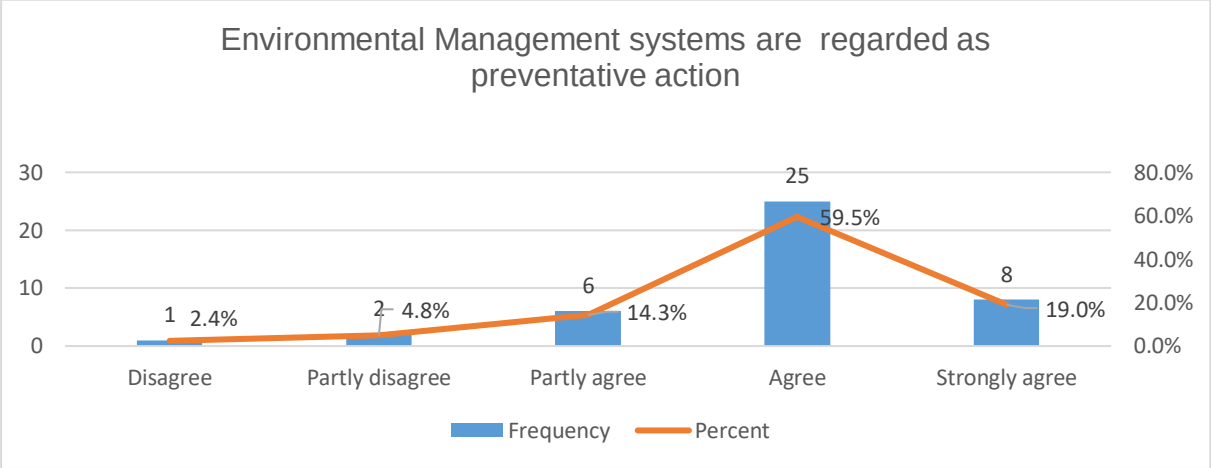

Figure 4.15: Environmental Management systems are regarded as preventative action

Of the 42 respondents, over 31 respondents agreed with the statement that “environmental management systems are regarded as preventative action”. Of these respondents, nearly 8 respondents (19%) strongly agreed and 25 (59.5%) agreed that at their organisations, EMSs were regarded as a preventative action. Only 3 respondents expressed negative views with 2 respondents (4.8%) partly disagreeing. A key feature in terms of an opportunity from implementing ISO 14001:2015 is that preventative environmental action could potentially proactively mitigate negative environmental impacts.

The assessment of the life cycle of goods is regarded as a mechanism employed to analyse the possible environmental effects as well as resources which are utilized in the duration of a product's life cycle (Kumar & Muthusamy, 2020). This extends from the acquisition of raw material to production as well as utilization stages encompassing waste management of the product (Kumar & Muthusamy, 2020). Figure 4.16 shows responses to the statement, "The life cycle of goods manufactured are taken into consideration.''

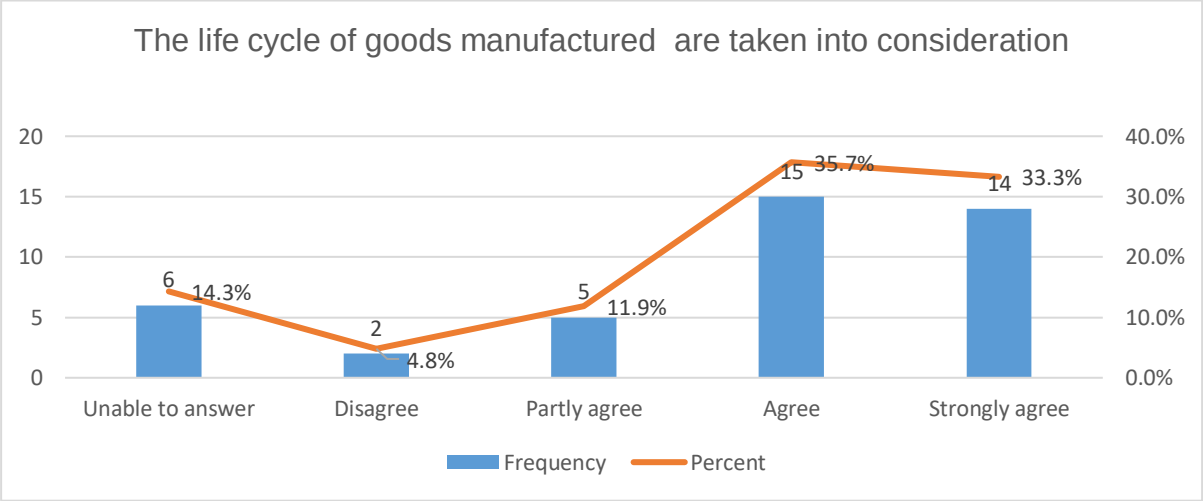

Figure 4.16: The life cycle of goods manufactured are taken into consideration.

Figure 4.16 Interpretation: Figure 4.16 indicates that a total of 14 respondents (33.3%) strongly agreed, while 15 respondents (35.7%) agreed and 5 respondents (11.9%) partly agreed that the life cycle of goods manufactured was considered in their experience with ISO 14001:2015 at organizations in the Durban region. Figure 4.16 therefore shows that almost 30 of all survey participants (69%) agree and strongly agree that the life cycle of goods manufactured are taken into consideration, representing most of the sample population. This is contrasted by Fonseca and Domingues (2018) in their study which highlighted the difficulty of the life cycle perspective to be implemented within the revised version of ISO 14001. The myriad of perspectives of life cycle implementation as both an opportunity and potential risk to successful ISO 14001:2015 EMS implementation highlights the highly specific nature of implementation opportunities.

According to Aguiari et al. (2016), adhering to the requirements of ISO 14001:2015 facilitated companies to improve their management of company resources. Figure 4.17 showed responses to the statement “Through the implementation of ISO 14001 company resources are better managed.”

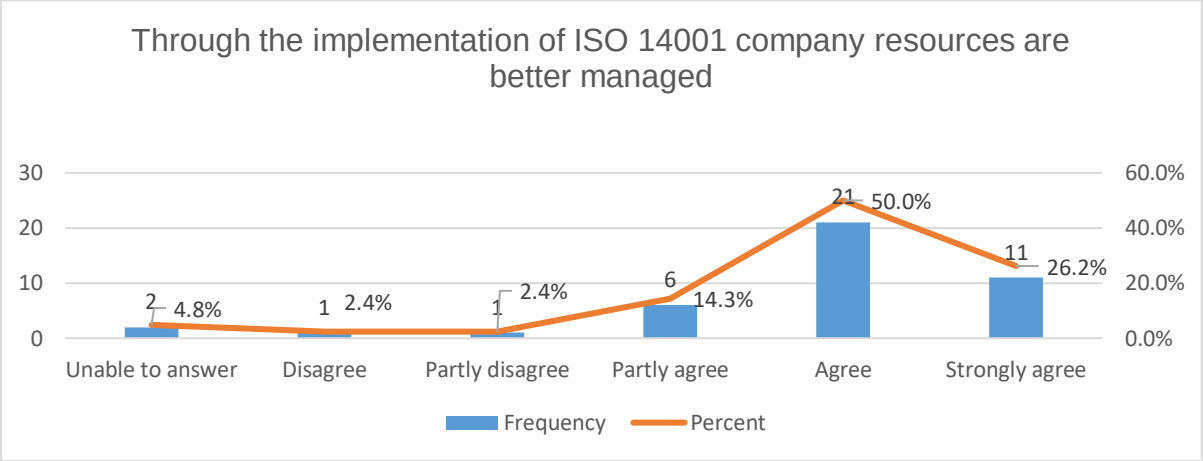

Figure 4.17: Through the implementation of ISO 14001 company resources are better managed

Nearly 90% of the respondents agreed to various extents with the statement that “through the implementation of ISO 14001 company resources are better managed”. Figure 4.17 illustrates that 11 respondents (26.2%) strongly agreed with the presented statement while 21 respondents (50%) agreed with it. Another 6 respondents (14.3%) partly agreed with the statement. These results show that an overwhelming 32 respondents (76.2%) either agreed or strongly agreed that through implementation of ISO 14001 company resources are better managed. This finding supported the study undertaken by Johnson (2018) in which it was stated that respondents’ companies’ water as well as electricity bills had been reduced since the implementation of the standard and was a clear opportunity of the implementation standard systems contributing to municipal bill payment.

Boiral et al. (2018) reported a positive correlation between ISO 14001:2015 certification and customer satisfaction. Figure 4.18 shows responses to the statement “Customer satisfaction is improved.”

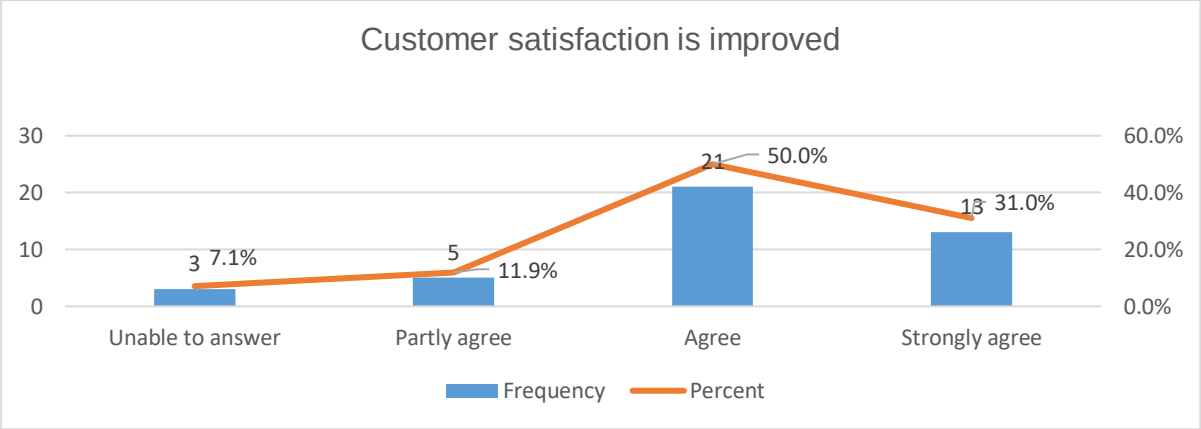

Figure 4.18: Customer satisfaction is improved.

Figure 4.18 Interpretation: Figure 4.18 shows an overwhelming 34 respondents (81%) either agreeing or strongly agreeing with the statement that “*customer satisfaction is improved*” through the implementation of ISO 14001:2015. This represents the sentiments of the majority of the respondents which were participating in the questionnaire. None among the respondents disagreed with this view albeit 3 respondents (7.1%) were not able to answer. This statement showed a median of 6 also indicating a general agreeability among the respondents that ISO 14001 enhances company resources management on one hand and improves customer satisfaction on the other.

The results supported the findings of Muzaimi, Chew, and Hamid (2017) which highlighted the role of ISO 14001 within an IMS as an effort which does improve customer satisfaction. This is particularly important as improved customer satisfaction could lead to financial gain which in turn can potentially offset the high maintenance costs of the certification.

Figure 4.19 shows responses to the statement “Financial savings are evident through the implementation of ISO 14001.” The respondents on average, partly believed that ISO 14001 had financial savings for the organization as shown by a mean score of 5.3 (SD=+/-1.9) for the statement “*Financial savings are evident through the implementation of ISO 14001”* as per table 5.

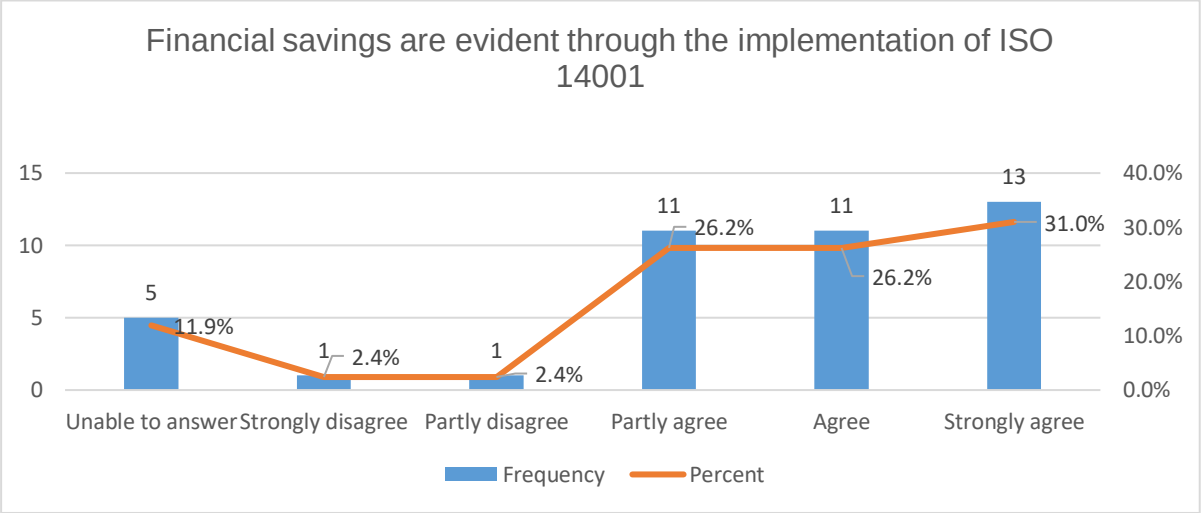

Figure 4.19: Financial savings are evident through the implementation of ISO 14001.

According to Figure 4.19, of the 42 respondents 13 respondents (31%) strongly agreed, 11 respondents agreed (26.2%) or partly agreed that ISO 14001 implementation came with financial savings. This supports the finding by Johnson (2018) who denoted that financial benefits to the adoption of ISO 14001:2015 are an opportunity which extend into an organization’s long-term operations, such that these financial benefits of the certification of an organization’s EMS can potentially justify the relatively high costs of the implementation of ISO 14001:2015.

Table 6 presents a summation of the mean, median, standard deviation, skewness and kurtosis score for questions 1b to 15b in the questionnaire.

Table 6: Summary of Mean/median scores for Part 3 Questions1b-Question15b

Statements	N	Mean	SD	Skew	Kurt
1b. You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements.	42	3,4	1,6	0,3	-1,2
2b. You lack understanding of the requirements to comply with ISO 14001:2015.	42	3,1	1,3	1,1	0,6
3b. Compliance to the ISO 14001 is a financial burden.	42	3,5	1,7	0,3	-0,9
4b. There is a lack of managerial involvement in the implementation of ISO 14001:2015	42	3,9	1,7	0,3	-1,2
5b. The certification is for the upgrading of public image and there are no significant improvements in environmental performance	42	3,5	1,4	0,7	-0,6
6b. There is no consideration of environmental policy in production.	42	3,0	1,2	1,1	1,8
7b. Increased costs relating to competency training are present.	42	4,6	1,8	-0,6	-0,8
8b. Large amounts of time is required for training required for competency regarding ISO 14001 implementation.	42	4,4	1,7	-0,2	-1,1
9b. There is a lack of cooperation from colleagues.	42	3,9	1,5	-0,1	-1,1
10b.Product procurement is impacted on placing uncertified suppliers at a disadvantage	42	4,5	2,1	-0,5	-1,1
11b.Time designated to the management of ISO integration complexity is limited.	42	4,7	1,5	-0,5	-1,1
12b.There is a top down approach without input utilized from employees regarding ISO 14001 implementation.	42	4,0	1,7	0,0	-1,3
13b. Maintenance costs of compliance to the standard are high.	42	4,3	1,6	-0,5	-0,6
14b. External stakeholder engagement does not occur.	42	3,3	1,5	0,5	-0,4

15b. Identified positive opportunities of ISO 14001 are not effectively utilized.	42	3,8	1,6	0,3	-1,3

According to Waxin et al. (2019) it is suggested that the lack of employee motivation is a risk to successful ISO 14001:2015 implementation. Figure 4.20 shows responses to the statement "You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements."

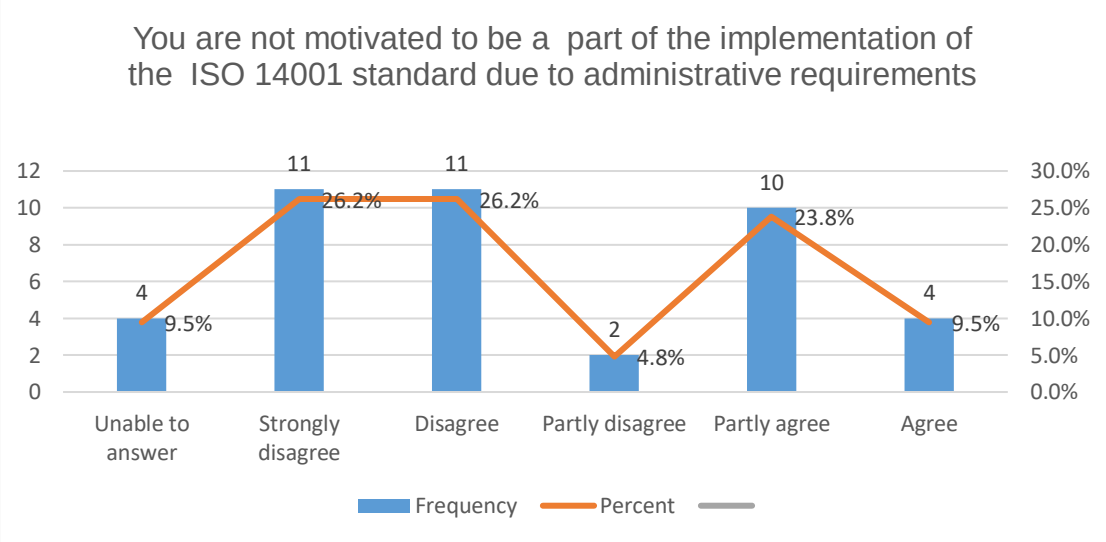

Figure 4.20: You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements.

Figure 4.20 Interpretation: According to Figure 4.20, 22 respondents (52.4%) of all survey respondents either disagree or strongly disagree that they are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements. Only 4 respondents (9.5%) agreed with this statement. This is statistically supported as the mean for the statement "*You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements"* was 3.4 (SD=+/-1.6). Therefore, on average the respondents were disagreeable with the statement. This indicated that SHERQ managers in the Durban region are motivated to be a part of the implementation of the standard despite considerable administrative requirements, therefore this can be identified as an opportunity towards the implementation of ISO 14001:2015.

Sennoga and Ahmed (2020) reported that “a learning organization is an effective and innovative organization that can successfully adapt to changing operational demands”. Figure 4.21 shows responses to the statement “You lack understanding of the requirements to comply with ISO 14001:2015.”

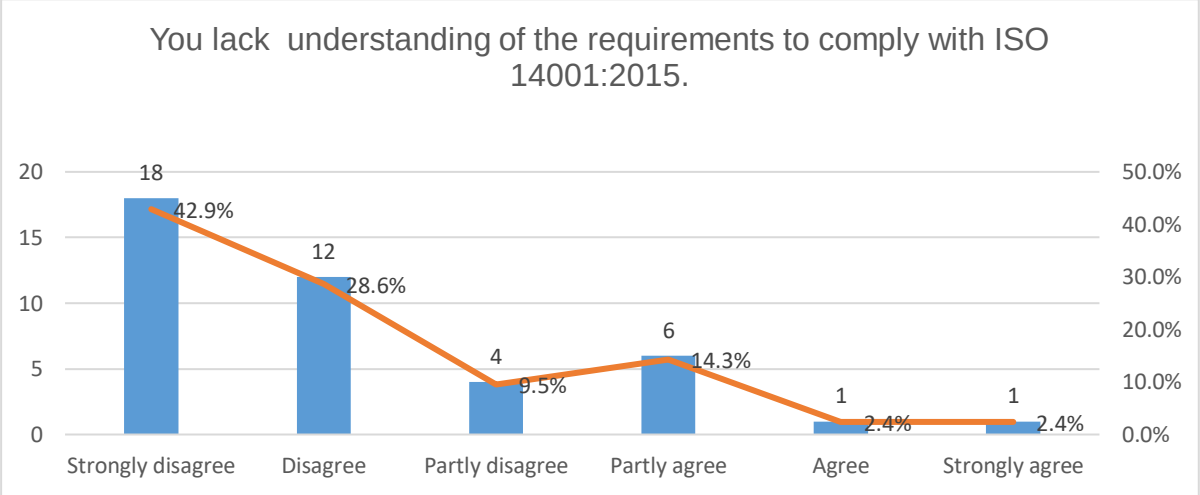

Figure 4.21: You lack understanding of the requirements to comply with ISO 14001:2015.

According to Boiral et al. (2017) the implementation of an ISO 14001:2015 certified EMS resulted in a positive effect on employee training. This supports the results shown in Figure 4.21 which indicates that 30 respondents (71%) did not agree with the statement that “*You lack understanding of the requirements to comply with ISO 14001:2015*”. On average, 71% of respondents disagreed and strongly disagreed that they lacked understanding of the requirements to comply with ISO 14001:2015. However, two of the respondents agreed with the statement reinforcing the need to provide appropriate training to organisations regarding the benefits and realities of implementing ISO 14001 in their organisations.

Environmental training is a pertinent component of competent environmental management, the cost of which is considered a key impediment in terms of ISO 14001:2015 from a financial viewpoint (Sennoga & Ahmed, 2020).

Figure 4.22 shows responses to the statement "Compliance to the ISO 14001 standard is a financial burden."

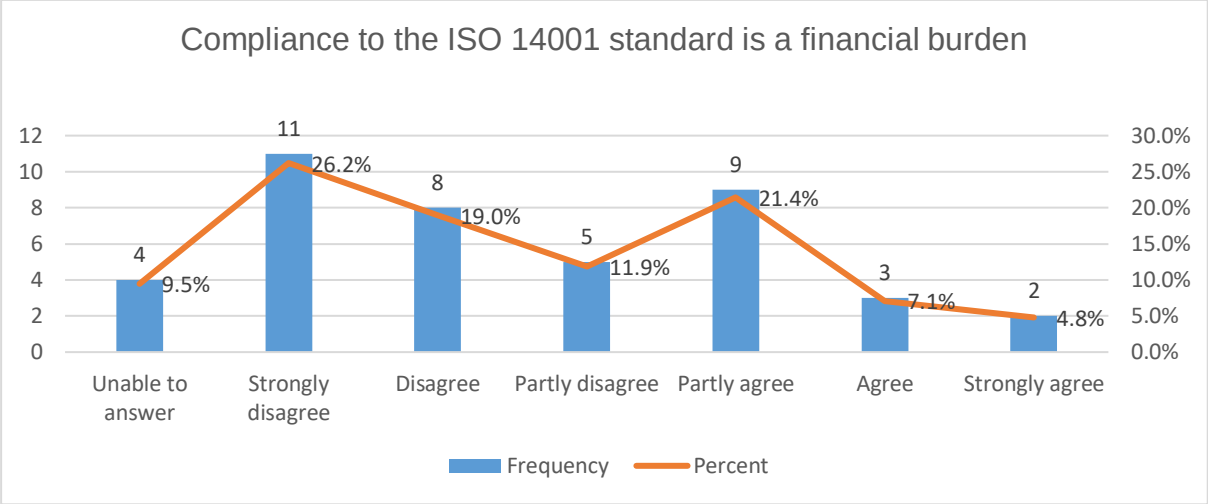

Figure 4.22: Compliance to the ISO 14001 standard is a financial burden.

Figure 4.22 indicates that only 3 respondents (7.1%) agreed that ISO 14001:2015 implementation is a financial burden. Furthermore, this was statistically supported as the mean score of the view that "*Compliance to ISO 14001 is a financial burden"* was 3.5 (SD=+/-1.7). This indicates that on average the respondents did not agree that compliance to ISO 14001 was a financial burden on organisations. Out of 42 respondents, 11 respondents (26.2%) strongly disagreed while 9 respondents (21.4%) partly agreed with the statement. A further 8 respondents (19%) disagreed. This supports the results from the study by Maliwatu (2018) stating that an ISO 14001-based EMS has a more positive effect on resource management leading to financial preservation. This is therefore an opportunity with which organizations can identify as it is indicative of the implementation costs of the certification being offset by the potential positive financial effects of an ISO 14001:2015 compliant EMS.

Vemuelen (2018) highlighted that top managerial involvement plays a key role in successful ISO 14001:2015 implementation. Figure 4.23 shows responses to the statement “There is a lack of managerial involvement in the implementation of ISO 14001:2015.”

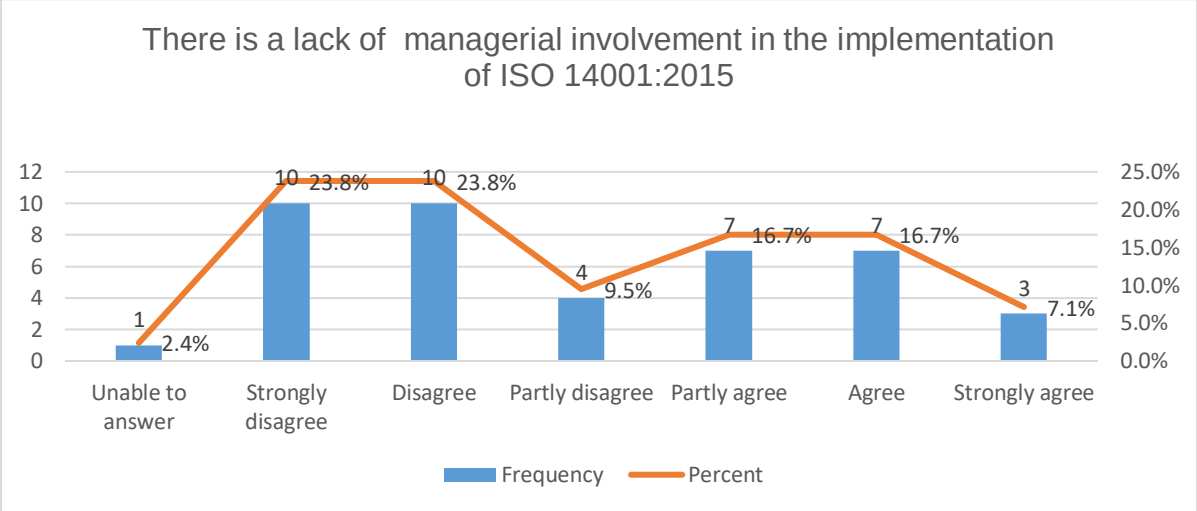

Figure 4.23: There is a lack of managerial involvement in the implementation of ISO 14001:2015

Figure 4.23 reflects that by frequency, nearly a half of the respondents; 20 respondents (47.6%), made up of two groups of 10 respondents each strongly disagreed and disagreed with the statement that “There is a lack of managerial involvement in the adoption of ISO 14001”. Another two groups of 7 respondents (16.7%) each comprising nearly a third of the respondents partly agreed and agreed to this statement. While overall, 24 respondents (57.1%) strongly disagreed, disagreed or partly disagreed with the statement, 17 respondents (40%) showed concern at the lack of managerial involvement in adopting ISO 14001. When over 40% of respondents are concerned at a possible lack of management involvement in implementing ISO 14001, and that management focus may be diverted at times of the COVID-19 epidemic in South Africa, these findings suggest that the lack of managerial involvement in the implementation of ISO 14001:2015 may be a risk factor as identified by SHERQ managers within the Durban region. Such a concern supports the findings of Sorooshian and Yee (2019) who suggested that a primary factor in the impeding of EMS adoption was the lack of top managerial concern.

Di Noia & Nicoletti (2016) suggested the risks of certification primarily for marketing purposes included attenuating the overall value of the certification. Figure 4.24 showed responses to the statement "The certification is for the upgrading of public image and there are no significant improvements in environmental performance."

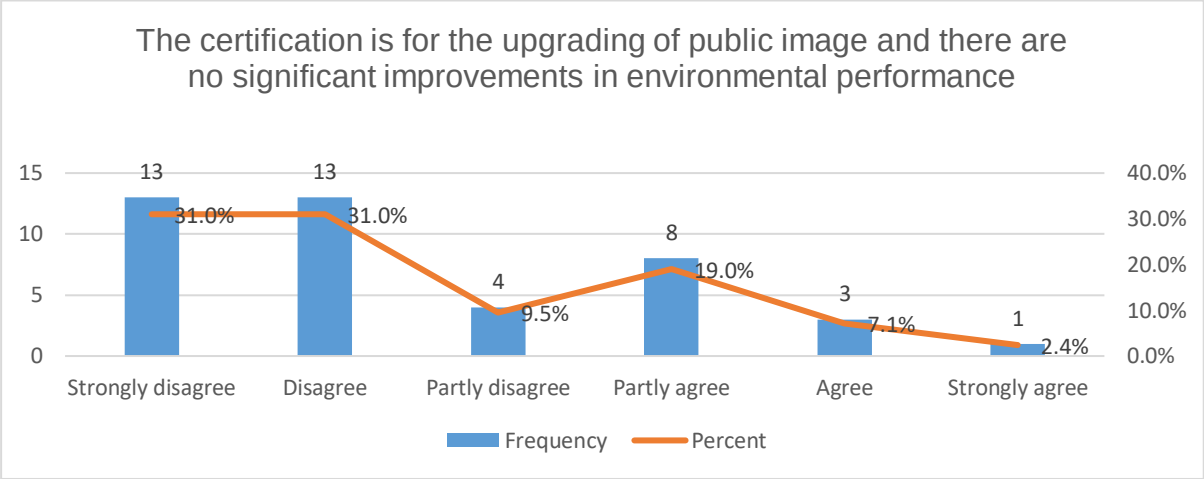

Figure 4.24: The certification is for the upgrading of public image and there are no significant improvements in environmental performance

Most of the 42 participants, 30 respondents (71.5%) disagreed with the statement that "*The certification is for the upgrading of public image and there are no significant improvements in environmental performance' '*Of these,13 respondents (31%) strongly disagreed while another 13 respondents (31%) disagreed with the statement. Furthermore, 8 respondents (19%) partly agreed with the statement. Therefore, Figure 4.24 shows that 26 respondents (62%) either strongly disagree or disagree that the certification is for upgrading of public image and there are no substantial developments in environmental performance. This accounts for the majority of surveyed participants. These findings are supported by Wairon, Esaul, Bambang Purwanggono, and Handayani (2018) as their study stated that ISO 14001:2015 implementation is a vital component in the improving of environmental performance once applied to the various facets of daily production.

Pimonenko, Bilan, Horák, Starchenko, and Gajda (2020) illustrated that greenwashing occurs when companies utilize certifications such as ISO 14001 for the sole purpose of marketing and not in practice. Figure 4.25 shows responses to the statement “There is no consideration of environmental policy in production.”

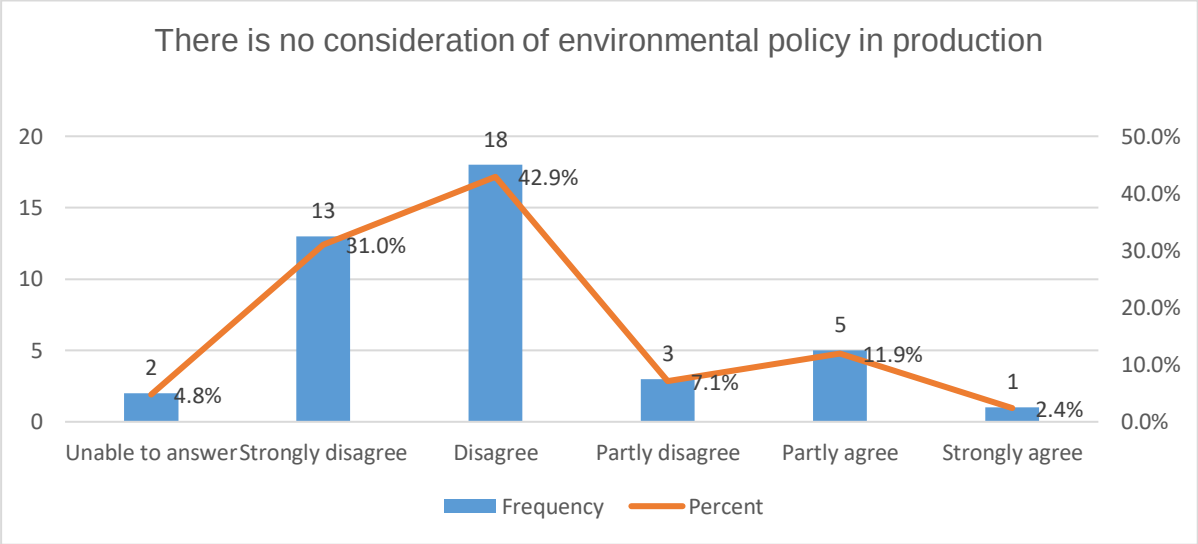

Figure 4.25: There is no consideration of environmental policy in production.

In response to the statement that *“There is no consideration of environmental policy in production”*, Figure 4.25 shows that 34 respondents (81%) disagreed to some extent with this statement. The mean score on the statement was 3.0 (SD=+/-1.2) and this indicates a general disagreement with the statement. This was a positive finding among SHERQ managers as the lack of consideration of the environment within environmental policy through core operational production at organizations would be a critical risk of ISO 14001:2015 implementation. Figure 4.25 shows that in the Durban region, the SHERQ managers surveyed suggest that greenwashing is not evident as per their indication of environmental policy consideration in production.

The mean for the statement *‘’Increased costs relating to competency training are present”* was 4.6 (SD=+/-1.8) according to table 6. Thus, on average, the respondents were partially agreeable that there were increased costs owing to competency training. Figure 4.26 shows responses to the statement “Increased costs relating to competency training are present.”

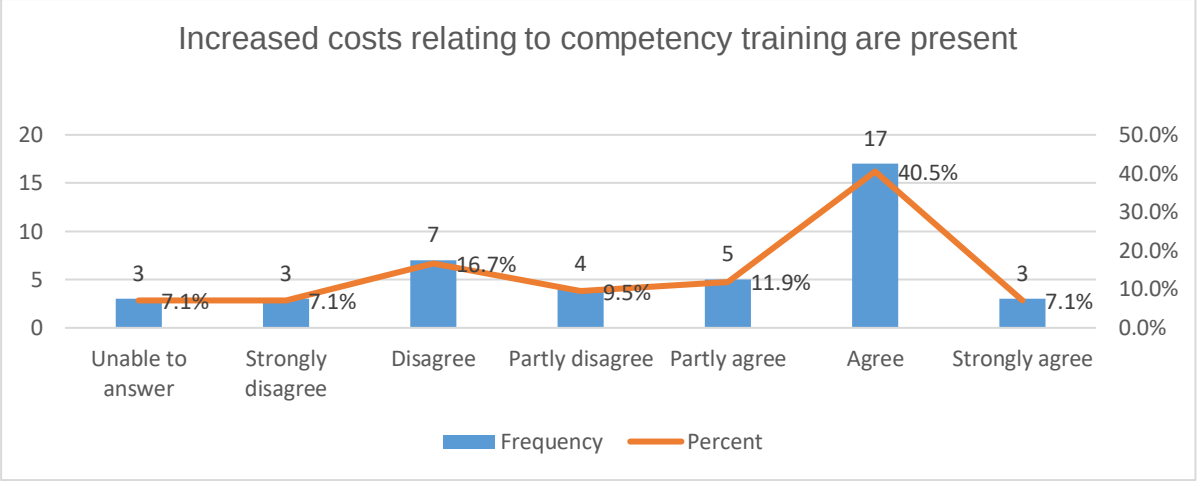

Figure 4.26: Increased costs relating to competency training are present.

From the sample assessed, Figure 4.26 shows that 25 respondents (59.5%) either strongly agree, agree or partly agree that there are increased costs relating to competency training present. This finding supported the results of a study conducted by Waxin, Knuteson, and Bartholomew (2019) which identified the costs of training employees as a key challenge in successful integration of ISO 14001:2015. Identification of this barrier in ISO 14001:2015 implementation within the Durban region is vital, as human resources were identified as one of the key determinants of ISO 14001:2015 implementation success. Thus, their competency is key. However, when read in conjunction to the statement, "*Compliance to the ISO 14001 is a financial burden"* with a mean of 3.5 (SD=+/-1.7), these costs are not viewed as an increased burden despite their presence.

The mean for the statement "*Large amounts of time are required for competency training regarding ISO 14001* implementation'' was 4.4 (SD=+/-1.7), this suggests that, on average, the respondents partly agree with this view according to table 6. Figure 4.27 shows responses to the statement "Large amounts of time are required for competency training regarding ISO 14001"

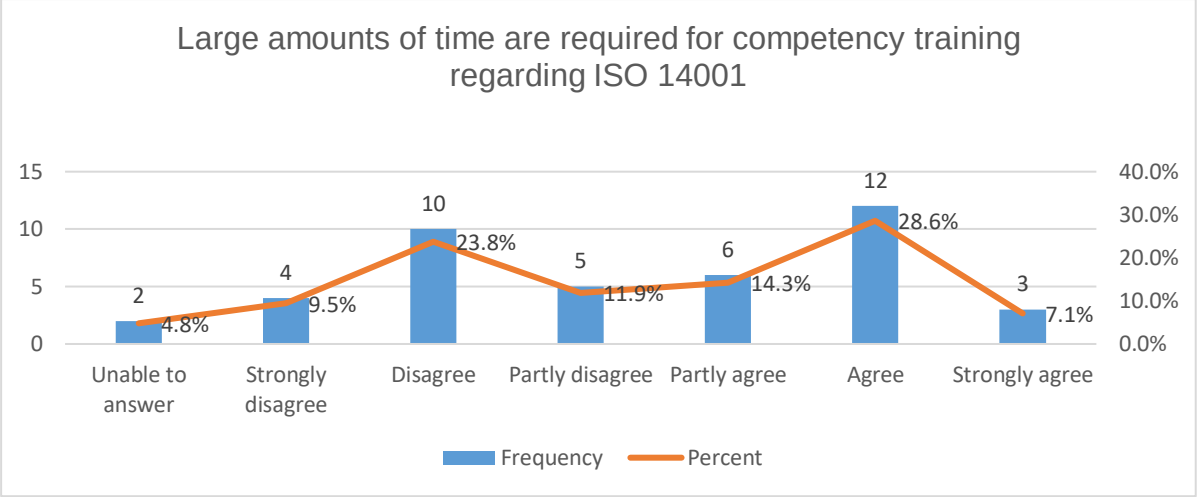

Figure 4.27: Large amounts of time are required for competency training regarding ISO 14001

In responding to the statement that "Large amounts of time are required for competency training regarding ISO 14001", Figure 4.27 shows that half of all surveyed SHERQ managerial staff, 21 respondents (50%) perceive ISO 14001:2015 implementation as an undertaking in which large amounts of time are required for training purposes. These respondents either agreed, partly agreed or strongly agreed with the statement presented to them. As 2 respondents were unable to answer to the statement, the majority opinion of the respondents was concern at expenditure involving ISO 14001 implementation costs. This coincided with the findings of Waxin et al. (2019) who stated that practical challenges such as implementation time costs could contribute to delays in the successful implementation of ISO 14001:2015. Interestingly, as mentioned above 2 respondents (4.8%) were unable to judge this which was a notable point as top management has a key function in the allocation of resources toward ISO 14001:2015 arenas such as training. Again, relative to the results shown in Figure 4.26 relating costs associated with ISO 14001 competency training, as this study was conducted during the time of the COVID-19 epidemic in South Africa and lockdown requirements placed financial stress on businesses in general, SHERQ managers were possibly prioritising their time/budgets away from ISO 14001 implementation and training costs.

The mean for the statement "*there is a lack of cooperation from colleagues*" was 3,9 (SD=+/-1,5) according to table 6 confirming that, on average, the

respondents partly agreed with this view. Figure 4.28 shows responses to the statement “There is a lack of cooperation from colleagues.”

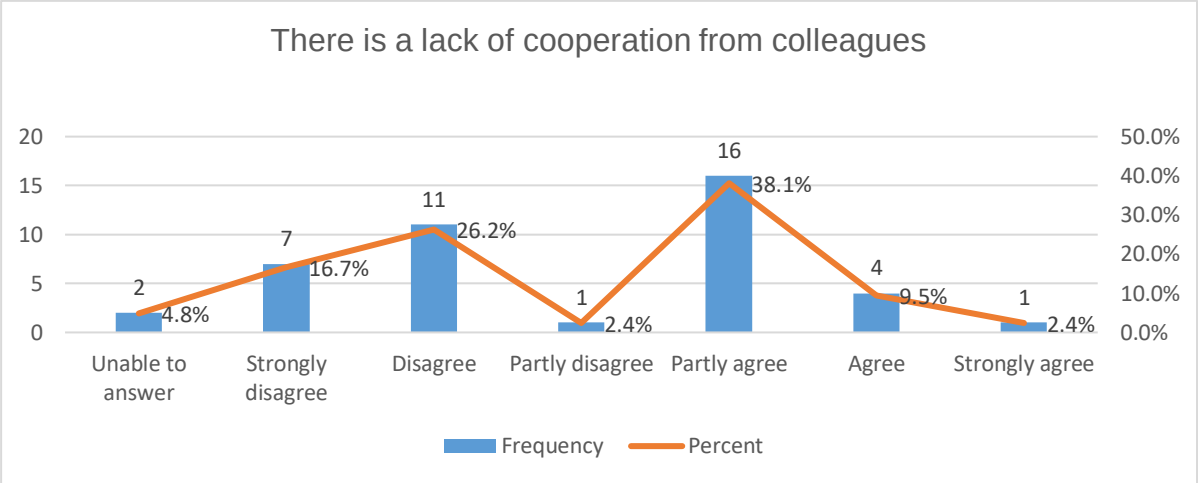

Figure 4.28: There is a lack of cooperation from colleagues.

Of the 42 responses to the statement that “*there is a lack of cooperation from colleagues*”, 21 respondents (50%) of survey participants agreed to some extent with the statement. Tene, Yuriev, and Boiral (2018) stated that the evident lack of financial resources in organizations results in the lack of human resources, or an orientation of human resources away from goals such as implementation of ISO 14001 and so providing a barrier to successful ISO 14001:2015 implementation. Again, the economic pressure resulting from the COVID-19 epidemic in South Africa may have forced organisations to review environmental factors as secondary priorities after business survival in a harsh economic climate during 2020 in South Africa. This economic pressure could translate into a reduction in human resources with a knock-on effect to potentially contribute to a lack of colleague corporation due to alternate employee requirements and the lack of administrative manpower to oversee implementation.

On the statement "*Product procurement is impacted on placing uncertified suppliers at a disadvantage"*, a mean score of 4.5 (SD=+/-2.1) was observed according to table 6, indicating a mean showing partial agreement. Figure 4.29 shows responses to the statement "Product procurement is impacted on placing uncertified suppliers at a disadvantage."

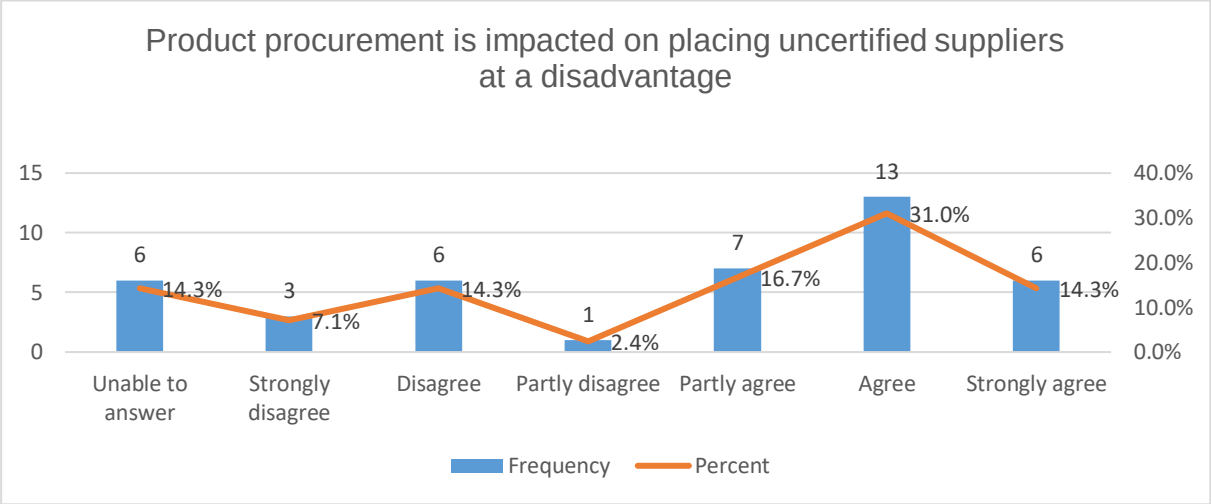

Figure 4.29: Product procurement is impacted on placing uncertified suppliers at a disadvantage.

Of the 42 respondents, 26 respondents (62%) either agreed, partly agreed or strongly agreed that suppliers who are not ISO 14001 certified are placed at a disadvantage and this negatively impacts on product procurement. In spite of the finding that 10 respondents (24%) disagreed to some extent with this statement, the responses to this statement suggest an opportunity for certified suppliers while at the same time presenting a risk to uncertified suppliers. This trend could be attributable to the external pressures from stakeholders to ensure green procurement practices. Lee et al. (2017) proposed that environmentally responsive supply chain management had not displayed any evidence of clear financial opportunities to supply chain affiliates however it does improve operational and environmental performance thus affirming the stance of SHERQ managers with regard to the placing of uncertified suppliers at a disadvantage.

Pesce, Critto and Marcomini (2018) suggest that limited time spent addressing the complexity of ISO 14001:2015 integration is a risk to successful

implementation. Figure 4.30 shows responses to the statement “Time designated to the management of ISO integration complexity is limited”

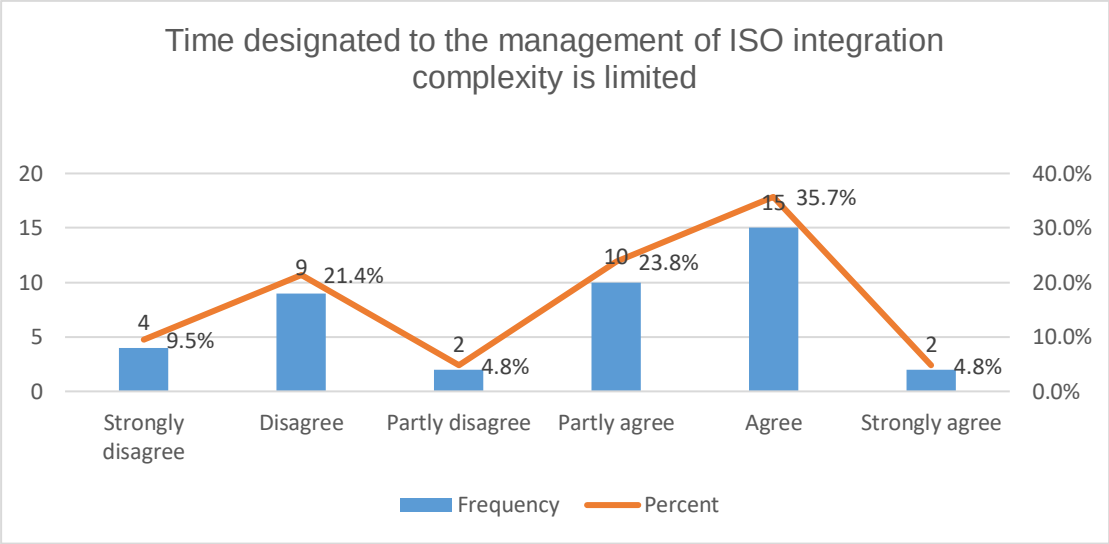

Figure 4.30: Time designated to the management of ISO integration complexity is limited

Out of 42 respondents, 15 respondents (35.7%) agreed with the statement, 10 respondents (23.8%) partly agreed and 9 respondents (21.4%) disagreed with the view that the time designated to the management of ISO integration complexity was limited, showing that on average, the sample agreed with the view. This can be related to the alternate operational requirements of a business taking precedence. This reveals a point of concern as according to Treacy (2019) firms which adopt ISO 14001 will experience benefits from internal coordination practice leading to enhancements within operations pertaining to time-based efficiency.

The mean for the statement “There is a top-down approach without input utilized from employees regarding ISO 14001 implementation” was 4.5 (SD=+/-2.1) according to table 6. Figure 4.31 shows responses to the statement “There is a top-down approach without input utilized from employees regarding ISO 14001 implementation.”

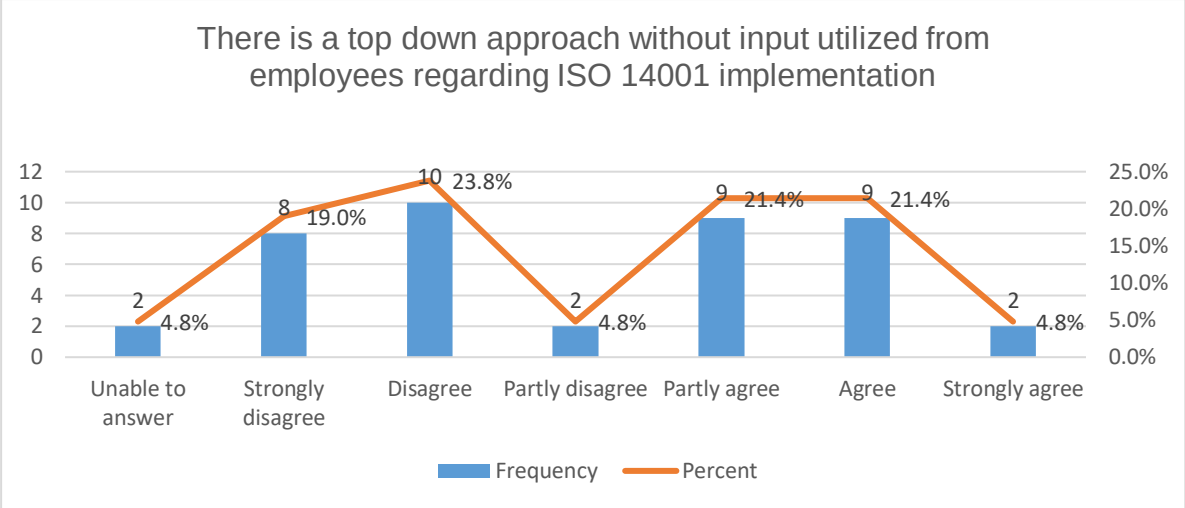

Figure 4.31: There is a top-down approach without input utilized from employees regarding ISO 14001 implementation

Out of the 42 respondents, 10 respondents (23.8%) out of 42 disagreed that there was a top-down approach. Additionally, 9 respondents (21.4%) and another 9 respondents (21.4%) partly agreed and agreed with the statement respectively while 8 respondents (19%) strongly disagreed. Therefore, on average the respondents were partly agreeable with the statement. This represents a considerably scattered response to top-down managerial approaches to ISO 14001 implementation. This further highlights a key point of Maliwatu (2018) which illustrated the highly organizationally specific nature of ISO 14001 implementation.

High and consistent maintenance costs of ISO 14001:2015 adoption is a risk as losing the ISO 14001 certification after initially obtaining it could potentially contribute to a lack of stakeholder and customer satisfaction. Figure 4.32 shows responses to the statement “Maintenance costs of compliance to the standard are high.”

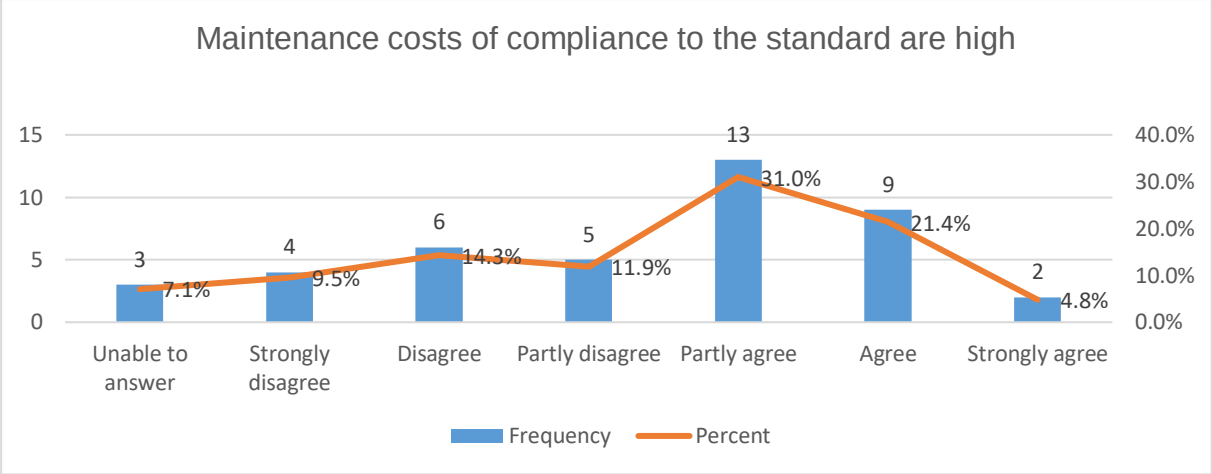

Figure 4.32: Maintenance costs of compliance to the standard are high

Figure 4.32 shows that 24 respondents (57.2%) of all participants either strongly agree, agree or partly agree that the "*maintenance costs of compliance to the standard are high*". These results represent the majority of the responses and confirm the results from the study conducted by Waxin et al. (2019) who cited training and auditing costs as primary risks and barriers to ISO 14001:2015 adoption.

Waxin et al. (2019) suggest that the lack of external stakeholder engagement is a potential risk to ISO 14001:2015 implementation. Figure 4.33 shows responses to the statement "External stakeholder engagement does not occur."

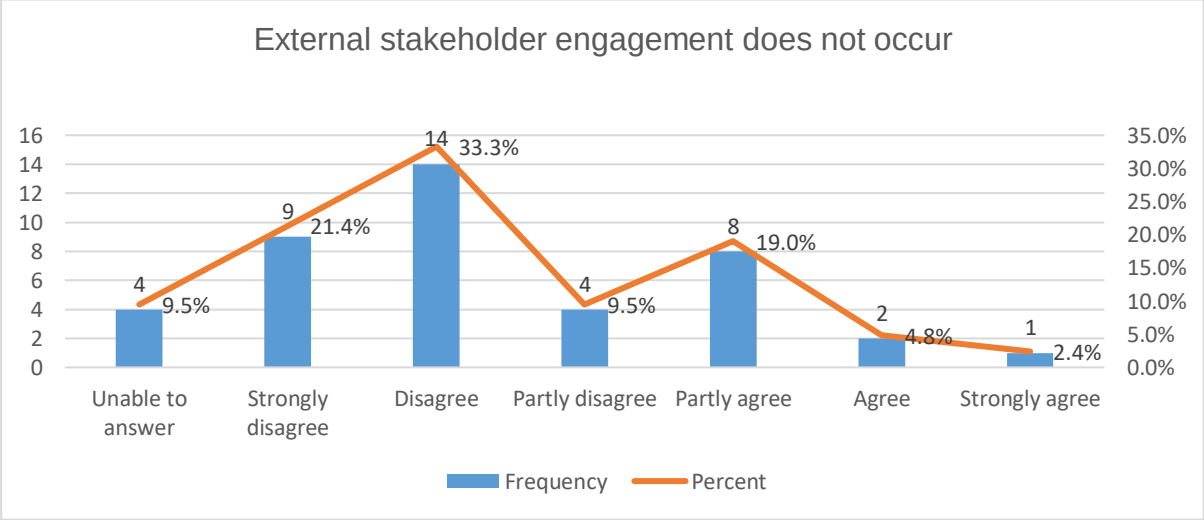

Figure 4.33: External stakeholder engagement does not occur.

The results of the responses to the statement "*External stakeholder engagement does not occur*" are shown in Figure 4.33 and indicate that 27 respondents -(64%) of the participants disagree to varying extents to the

statement. The mean for the statement *was* 3.3 (SD=+/-1.5) confirming that, on average, the respondents disagreed with the statement. Thus, the majority of the SHERQ managers indicated that external stakeholder engagement does occur with regards to ISO 14001:2015 implementation. This was a key finding as according to Maliwatu (2018) stakeholder expectations within the business unit level are interconnected to external stakeholders.

The mean for the statement," Identified *positive opportunities of ISO 14001 are not effectively utilised"* was 3.8 (SD=+/-1.6) according to table 6. On average the respondents were disagreeable with the statement. Figure 4.34 shows responses to the statement "Identified positive opportunities of ISO 14001 are not effectively utilized."

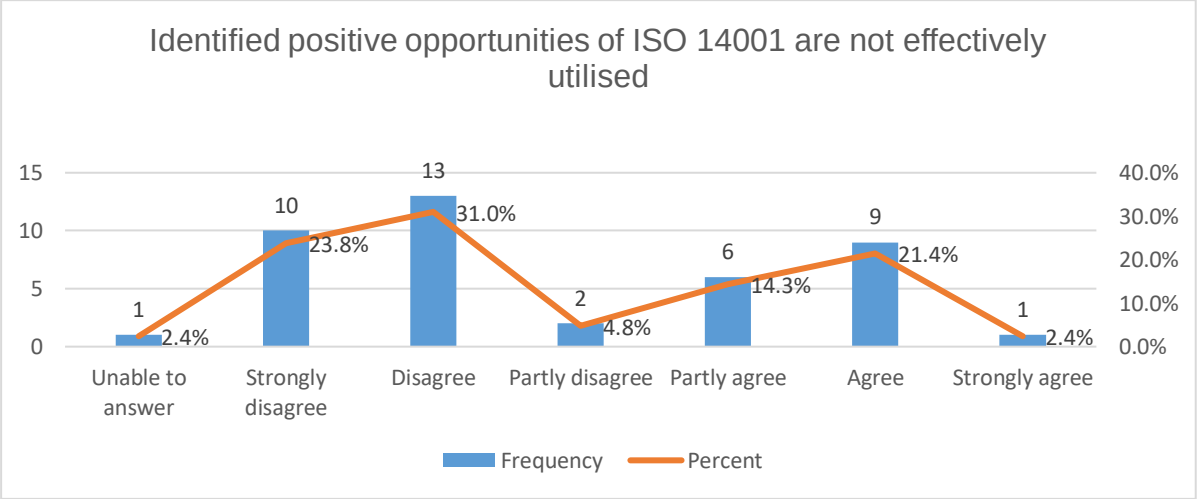

Figure 4.34: Identified positive opportunities of ISO 14001 are not effectively utilized

Figure 4.34 shows that 23 respondents (54.8%) disagreed or strongly disagreed with the statement that the "identified positive opportunities of ISO 14001 are not effectively utilized, 10 respondents (23.8%) that indicated that the respondents either agreed or strongly agreed with the statement. This finding contrasts with that of the results from the study conducted by Nascimento, Santos, and Oliveira (2020) whose interviews responses indicated that the majority of participants observed the ISO 14001 EMS implementation focus as another administrative task allocated to a member of management, thus indicating critical leadership complications resulting in such companies having difficulties with most leaders limited in their comprehension and

commitment to an EMS. From a Durban regional perspective, local SHERQ managers appear to wholeheartedly approve of and accept the opportunities linked with the adoption of ISO 14001 but in the current economic climate, they are hesitant to take on the responsibilities of ISO 14001 – the expenses associated with training and implementation of the standard and the continued auditing and effective maintenance of this standard.

4.4 Fishers exact tests and correlations

The Fisher's exact test of independence is utilized in research when 2 nominal variables are present and it is required to differentiate if the size of one variable is varied in accordance to the value of the alternate variable (McDonald, 2020). It is advised to be utilized if a small sample is to be analysed, therefore it applies to this study which had a sample size of under 50 respondents due to limiting parameters such as study duration.

When the projected samples are small Fisher's exact test is more precise than the *G*–test of independence (McDonald, 2020).The probability of obtaining the pragmatic data was calculated, and all data sets with more extreme deviations were thereby identified, under the null hypothesis that the proportions are the same. Fisher’s exact tests were undertaken on the data utilizing respondents’ training as well as departments (and competency training on ISO 14001:2015 received) as test variables. It additionally displays the correlation results between the percentage of time spent on ISO-related activities in conjunction with respondents’ perceptions.

Fisher’s exact tests by Department

Table 7: Fisher’s exact tests by Department

Variable	Statement	Fisher's Exact	Sig.	Cramer's V	Sig.
Department	The company you are employed by meets community and public expectations regarding environmental performance.	16,6	0,018	0,37	0,07
	Top management implement proactive environmental measures.	18,6	0	0,42	0
	You are not motivated to be a part of the implementation the ISO 14001 standard due to administrative requirements.	23,7	0,01	0,5	0,01
	You lack understanding of the requirements to comply with ISO 14001:2015.	27,6	0	0,46	0,03
	Compliance to the ISO 14001 is a financial burden.	22,8	0,05	0,45	0,116
	There is a lack of managerial involvement in the implementation of ISO 14001:2015	28,5	0,03	0,54	0,018
	The certification is for the upgrading of public image and there are no significant improvements in environmental performance	23,6	0,01	0,48	0,04
	External stakeholder engagement does not occur.	25,7	0,02	0,5	0,04

The results display that there were statistically significant Fisher’s exact tests on the following:

(Fe: Fisher’s exact, p: Probability value, SD: Standard deviation)

- The company you are employed by meets community and public expectations regarding environmental performance (Fe=16,6, p=0,018).
  Top management implement proactive environmental measures (Fe=18,6, p=0.00).
- You are not motivated to be a part of the implementation the ISO 14001 standard due to administrative requirements (Fe=23.7, p=0,01).
- You lack understanding of the requirements to comply with ISO 14001:2015. (Fe=27.6, p=0.00).
- Compliance to the ISO 14001 is a financial burden (Fe=22.8, p=0,05).
- There is a lack of managerial involvement in the implementation of ISO 14001:2015 (Fe=28.5, p=0.03).
- The certification is for the upgrading of public image and there are no significant improvements in environmental performance (Fe=23.6, p=0,01)
- External stakeholder engagement does not occur (Fe=25.7, p=0,02).

The illustrates that the responses pertaining to the above statements significantly differed per department. This suggests that despite the operational and general managers additionally assuming the role of SHERQ managers, respondents who were solely SHERQ managers did have considerably unique views compared to the other groups in this regard. This may be attributable to their long-term in-depth encounters with the standard. Cramer's V tests which show strength of association furthermore illustrating that these variations from 0.37 to 0.54 were considerably strong.

In response to the statement ''*The company you are employed by meets community and public expectations regarding environmental performance''* the results show that SHERQ management had the highest mean *(*mean=6.5) and therefore was the most positive group compared to general managers (mean= 6.0) and operational managers (mean=6.0). This was also higher than the total sample mean on the same statement indicating a stronger agreeability of the SHERQ management group. Mean scores were used as it was established using Kurtosis (measure of heavy tail or light tail distribution in comparison to normal distribution) and skewness measures that response patterns lay within a normally distributed range.

Operations Management had the highest mean scores, and were therefore the most positive group on the following statements:

- *You lack understanding of the requirements to comply with ISO 14001:2015* (Mean=4.2, SD=+/-1.5)
- *External stakeholder engagement does not occur* (Mean=4.0. SD=+-/2.0)

In both instances, Operations Management had mean scores higher than the total mean scores indicating a more agreeable position than the other groups.

The “General Management” group had higher mean scores than the rest of the departmental groups on the following statements:

- *Top management implement proactive environmental measures* (Mean=7.0, SD=+/-0.0)
- *There is a lack of managerial involvement in the implementation of ISO 14001:2015* (Mean=5.0, SD=+/-0.0)
- *The certification is for the upgrading of public image and there are no significant improvements in environmental performance* (Mean=4.5, SD=2.1)

The respondents, as classified by department did not respond to any other statements besides the above in a way that showed significant departmental response patterns. This indicates that the groups shared similar views on these excluded statements with any differences among them being random.

Fisher’s exact tests by training

The table below displays the statements which had statistically significant associations illustrated through undertaking a competency test using a Fisher’s exact test and a p-value of 0.05. The Cramer V scale presented >0.25 as very strong, >0.15 as strong, >0.10 as moderate, > 0.05 as weak and >0 as very weak (Akoglu, 2018).

Table 8: Fisher's exact tests by training

Statement	Fisher's	Sig.	Cramer's V	Sig.
Continuous improvement projects are taking place.	10.3	0.04	0.52	0.04
Increased clarity of operational mechanisms is evident.	6.7	0.05	0.44	0.04
You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements.	10.6	0.02	0.55	0.03
You lack understanding of the requirements to comply with ISO 14001:2015.	10.2	0.03	0.53	0.04
Large amounts of time are required for training required for competency regarding ISO 14001 implementation.	10.9	0.03	0.56	0.04
There is a lack of cooperation from colleagues.	12.6	0.02	0.6	0.01
There is a top down approach without input utilized from employees regarding ISO 14001 implementation.	12.7	0.01	0.6	0.01
External stakeholder engagement does not occur.	12	0.02	0.6	0.014

The above variations were regarded as significantly large considering Cramer's V test scores ranging between 0.44 and 0.6. Further statistical tests were undertaken for identification of the source of the above illustrated differences. Mean scores were used, and determined, using skewness and kurtosis measures it was displayed that the responses were close to normally distributed. The following statements shown in table 8 showed significant fishers exact scores:

- Continuous improvement projects are taking place.
- Increased clarity of operational mechanisms is evident.
- You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements.
- You lack understanding of the requirements to comply with ISO 14001:2015.

- Large amounts of time are required for training required for competency regarding ISO 14001 implementation.
- There is a lack of cooperation from colleagues.
- There is a top-down approach without input utilized from employees regarding ISO 14001 implementation.
- External stakeholder engagement does not occur.

The significant FE scores shown above relate that there are positive associations between the statements presented to the respondents and ISO 14001:2015 training thereby meaning that responses to the aforementioned statements significantly differed between respondents who did have training and those who did not have training.

Table 9: Further analysis of statistically significant Fisher's exact test scores using mean – Training

Statement	Training Y/N	N	Mean	SD
Continuous improvement projects are taking place.	No	8	5,3	2,3
	Yes	34	6,1	0,9
	Total	42	6,0	1,3
Increased clarity of operational mechanisms is evident.	No	8	4,9	2,0
	Yes	34	6,0	0,8
	Total	42	5,8	1,2
You are not motivated to be a part of the implementation the ISO 14001 standard due to administrative requirements.	No	8	3,3	2,2
	Yes	34	3,4	1,4
	Total	42	3,4	1,6
You lack understanding of the requirements to comply with ISO 14001:2015.	No	8	4,4	1,7
	Yes	34	2,8	1,0
	Total	42	3,1	1,3
Large amounts of time are required for training required for competency regarding ISO 14001 implementation.	No	8	4,1	2,4
	Yes	34	4,4	1,5
	Total	42	4,4	1,7
There is a lack of cooperation from colleagues.	No	8	4,0	2,3
	Yes	34	3,9	1,3
	Total	42	3,9	1,5
	No	8	3,9	2,3

There is a top down approach without input utilized from employees regarding ISO 14001 implementation.	Yes	34	4,1	1,6
	Total	42	4,0	1,7
External stakeholder engagement does not occur.	No	8	3,1	2,2
	Yes	34	3,4	1,3
	Total	42	3,3	1,5

Respondents who attended competency training had higher mean responses on the subsequent statements:

- Continuous improvement projects are taking place.
- Increased clarity of operational mechanisms is evident.
- You are not motivated to be a part of the implementation the ISO 14001 standard due to administrative requirements.
- Large amounts of time are required for training required for competency regarding ISO 14001 implementation.
- There is a top-down approach without input utilized from employees regarding ISO 14001 implementation
- External stakeholder engagement does not occur.

The above is evidence that those respondents who had undergone competency training tended to agree more with the above statements in comparison to those who had not. This was suggestive that training could be associated with their responses.

Respondents who had not undergone competency training had higher mean scores on the following statements:

- You lack understanding of the requirements to comply with ISO 14001:2015.
- There is a lack of cooperation from colleagues.

This suggests that the absence of training could be associated with an absence of understanding of the requirements necessary to comply with the ISO 14001:2015 standard as well as being associated with a perception that there was a lack of cooperation from one's colleagues.

Pearson's correlations

Pearson's correlations which measure strength of linear associations among variables (McDonald, 2020) were conducted to measure the correlations between the percentage of time spent working on ISO-related activities and various perceptions. Strength of associations are measured from R values which encompass 0-0.19 as very weak, 0.20-0.39 as weak, 0.40-0.59 as moderate, 0.60-0.79 as strong and 0.80-1.00 as very strong (Kowang, Long & Rasli, 2015).

Table 10: Further analysis of statistically significant Fisher's exact test scores using mean and the percentage of time spent on ISO-related activities

Statement	N	r	Sig.
The increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement.	42	0,40	0,01
The company you are employed by meets community and public expectations regarding environmental performance.	42	0,33	0,04
Top management implement proactive environmental measures.	42	0,36	0,02
Environmental concepts such as pollution prevention are widely communicated among operations.	42	0,31	0,05
Employees have clarity regarding all operations as well as their potential improvements.	42	0,39	0,01
Targets are more clearly delineated.	42	0,40	0,01
Continuous improvement projects are taking place.	42	0,37	0,01
Increased clarity of operational mechanisms is evident.	42	0,56	0,00
Through the implementation of ISO 14001 company resources are better managed.	42	0,41	0,01
You lack understanding of the requirements to comply with ISO 14001:2015.	42	(0,52)	0,00
There is a lack of managerial involvement in the implementation of ISO 14001:2015	42	(0,41)	0,01
The certification is for the upgrading of public image and there are no significant improvements in environmental performance	42	(0,35)	0,02

Product procurement is impacted on placing uncertified suppliers at a disadvantage	42	(0,30)	0,05
Time designated to the management of ISO integration complexity is limited.	42	(0,40)	0,01
Identified positive opportunities of ISO 14001 are not effectively utilized.	42	(0,36)	0,02

The responses illustrated a moderate to strong positive correlation between the percentage of time spent on ISO-related activities and the following statements:

- The increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement.
- The company you are employed by meets community and public expectations regarding environmental performance.
- Top management implement proactive environmental measures.
- Environmental concepts such as pollution prevention are widely communicated among operations.
- Employees have clarity regarding all operations as well as their potential improvements.
- Targets are more clearly delineated.
- Continuous improvement projects are taking place.
- Increased clarity of operational mechanisms is evident.
- Through the implementation of ISO 14001 company resources are better managed.

As illustrated above, respondents who spent more time on ISO-related activities tended to disagree with the following views:

- You lack understanding of the requirements to comply with ISO 14001:2015.
- There is a lack of managerial involvement in the implementation of ISO 14001:2015
- The certification is for the upgrading of public image and there are no significant improvements in environmental performance
- Product procurement is impacted on placing uncertified suppliers at a disadvantage
- Time designated to the management of ISO integration complexity is limited.

- Identified positive opportunities of ISO 14001 are not effectively utilized.

Thus, negative moderately strong to strong correlations ranging from r = -0.30 to 0.51 were evident from the findings above.

Overall, the correlation coefficient illustrates that the longer the time one spends in ISO-related activities, the more positive (agreeable) they are to any positive aspects of ISO implementation. In addition, the longer they worked with ISO-related activities the less they agreed with any negatively framed ISO views. Thus, respondents tended to have positive correlations with positively framed statements and negative correlations with negatively framed statements. Annexure C details the summation of respondent's overall feedback critically outlining and summarizing the key opportunities and risks of ISO 14001:2015 implementation from the perspectives of SHERQ managers in Durban, KwaZulu-Natal.

Chapter 5: Conclusions and Recommendations

Environmental degradation due to high levels of air, water and land pollution within the Durban region has had a precarious impact on the wellbeing and health of residents in the region. Environmental standards such as ISO 14001 have shown the potential to advance industrial performance environmentally. The implementation of an EMS certifiable with ISO 14001 encompasses various and dynamic risks and opportunities.

The aim of this research was to understand the SHERQ managerial perspectives of the risks and opportunities in ISO 14001:2015 implementation in Durban, KwaZulu- Natal.

In order to accomplish this, three study objectives were formulated in the first chapter of this study. The first objective was to identify ISO 14001 implementation opportunities and risks internationally and nationally by means of an extensive review of relevant international as well as national literature sources. This was formulated to achieve an understanding of ISO 14001:2015 overall in order to better frame a regionally contextual understanding of the risks and opportunities associated with implementing ISO 14001 in organisations based in Durban.

This extensive review was followed by the generation of an evaluation framework to assess SHERQ managerial perspectives of the risks and opportunities in ISO 14001:2015 implementation. This assessment instrument informed a questionnaire consisting of three parts: the responses to Part 1 provided data regarding the organisational demographics of the respondents while Part 2 and Part 3 each consisted of 15 statements so that responses provided data regarding organisational opportunities or organisational risks, respectively, regarding implementation of ISO 14001. This questionnaire was formulated to reflect and apply the key performance areas identified within the vital literature review.

The third objective of the research entailed using graphical and statistical assessment of the study data to analyse SHERQ managerial responses to the 30 statements in the questionnaire that identified ISO 14001:2015

implementation risks and opportunities. This allowed an analysis of SHERQ managerial perspectives of the dynamic process of ISO 14001:2015 implementation so as to identify the key risks for mitigation purposes and the key opportunities for continuous improvement purposes.

5.1 Study conclusions

In concluding this research, the objectives of the dissertation will be revisited:

Study objective 1: To identify ISO 14001 implementation opportunities and risks internationally and nationally by means of an extensive review of international as well as national literature sources.

National studies such as Piek (2019) detailed the opportunities of ISO 14001 implementation in improving an organizations potential to respond to environmental operational impacts despite implementation costs. Furthermore, international studies such as the study conducted by Waxin, Knuteson and Batholomew (2019) highlighted the importance of ISO 14001:2015 in organizations from a regulatory perspective as the certification facilitates organizational compliance when successfully adhered to. This brief analysis of study objective 1 supports the assertion that this objective was suitably addressed in this study.

Study objective 2: To generate an evaluation framework to assess SHERQ managerial perspectives of risks and opportunities of ISO 14001:2015 implementation within Durban. Chapter 3 illustrated the development of the Likert scale-based questionnaire generated from the KPI's and KPA's identified from the review of essential literature. The questionnaire was targeted at SHERQ managers due to their important role at top managerial level pertaining to the successful implementation of the standard.

A total of 62 of these questionnaires were sent via email as well as LinkedIn to various SHERQ managers within the region and responses were received from 42 of these managers. This relates that 67% of all SHERQ managers responded to the questionnaire to reflect their personal opinions and experiences pertaining to the adoption ISO 14001:2015. Thus, this questionnaire accessed their perspectives as to the key risks and opportunities

aligned with the implementation of the standard in their organisations based in Durban. This brief analysis of study objective 2 supports the assertion that this objective was suitably addressed in this study.

Study objective 3: To analyse SHERQ managerial responses to the ISO 14001:2015 implementation risks and opportunities within the Durban region.

This analysis process within chapter 4 of the study showed various insights pertaining to the opportunities and risks of ISO 14001:2015 implementation which can be drawn by organizations which implement ISO 14001 in order to exploit the standard's opportunities and proactively mitigate the identified risks.

The key findings showed that SHERQ managers did agree that ISO 14001:2015 was not a financial strain on organizations, however it was further agreeable that the implementation of the standard was a high-cost endeavor. Furthermore, key findings from SHERQ managers in the Durban region showed that SHERQ managers agreed that the increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement. Additionally, the key conclusions from this research endeavor showed that through the implementation of ISO 14001:2015 and subsequent compliance leading to certification, there are increased investor inputs and environmental concepts such as pollution prevention are more widely communicated among operations.

According to SHERQ managers in the Durban region, the compliance to ISO 14001:2015 at organizations had resulted in the life cycle of goods manufactured being taken into consideration. This was a particularly key finding specific to the 2015 revision of the standard as product life cycle assessments are a new addition to the standard as well as a vital one due to the significant environmental impacts of production in the Durban region. It would be key to assess if taking life cycle assessments of goods and services into consideration has a quantifiable environmental impact in the Durban regions primary production industries. SHERQ managers in the Durban region showed a strong propensity to agree with the view that company resources are better managed through ISO 14001 implementation and that customer satisfaction is improved.

According to SHERQ managers in the Durban region, their responses to the aforementioned questionnaires shows that 62% of respondents either strongly disagreed or disagreed that the ISO 14001:2015 certification is for the upgrading of public image and there are no substantial enhancements regarding performance environmentally, this implies noteworthy environmental progresses in organization performance regarding the environment are present through the implementation of ISO 14001:2015. However, this finding also presents a risk in terms of potentially misleading stakeholders as the standard lacks monitoring and measurement mechanisms in order to sufficiently quantify and illustrate continuous improvement in an environmental performance context.

The research question upon which this study was based was" What are SHERQ managerial perspectives of the risks and opportunities in the implementation of ISO 14001:2015 in Durban, KwaZulu-Natal?'' Through achieving the aim and objectives of this research, this research question was answered while comprehensively addressing all the key performance indicators sourced from extensive literature review within questionnaires posed at the target audience of SHERQ managers within the Durban region. Key perspectives of the risks and opportunities of ISO 14001:2015 implementation have been assimilated and can be utilized as an input to the research in this regard in order for the progression in continuous improvement in ISO 14001 certified organizations within the Durban region. This study may additionally be applied as a basis of future comparative assessment of literature to researchers as well as non-certified organizations within the Durban region for further managerial insights into the dynamic ISO 14001:2015 implementation process.

Overall, the results assessing the responses of SHERQ managers within the Durban region showed the greater amount of time one spends engaged with ISO-related activities, the more positive (agreeable) they are to any positive aspects of ISO implementation. In conjunction with the aforementioned the longer SHERQ managers had worked with ISO-related activities the less they agreed with any negatively framed ISO 14001:2015 implementation views. Therefore, this relates that overall, the respondents tended to have positive correlations with positively framed statements in addition to negative

correlations with negatively framed statements as illustrated in chapter 4 of the study.

This study illustrated that there were numerous opportunities and risks of ISO 14001:2015 implementation which were perceived by SHERQ managers within the Durban region. In order to precisely undertake the identification of the opportunities and risks of ISO 14001:2015, it was key to initially assess the variations to the prior 2004 version of the standard compared to the current standard within the literature review for the purpose of potential continuous improvement opportunity identification (Jensen & Bondesson, 2016). This brief analysis of study objective 3 supports the assertion that this objective was suitably addressed in this study.

5.2 Recommendations

The subsequent recommendations presented show potential arenas for future analysis considering the conclusions with regards to the empirical research as well as those identified within the extensive literature review. A vital finding of the research was that despite the financial viability of the ISO 14001:2015 implementation, considerable costs were involved in the implementation process according to the SHERQ managers surveyed within the Durban region. This highlighted the importance of continuous compliance to the standard to ensure the offsetting of these high maintenance and implementation costs.

A quantifiable assessment forming the basis of research into the primary costs of ISO 14001:2015 specific to the Durban region would assist SHERQ managers regarding streamlining the costs of the implementation risks such as high costs that they highlighted in this research. Furthermore, it is suggested to conduct a future study specifically intended at ascertaining of the risks of a lack of competency training as within this study it was noted that despite the surveys being aimed at SHERQ practitioners at managerial level, there were respondents that received no training regarding ISO 14001:2015 implementation.

A further research recommendation is to investigate the correlation between the amount of time spent on ISO 14001:2015 associated activities and the environmental performance of organizations within Durban. This study showed that the majority of SHERQ managers only spent up to 25% of their time on ISO 14001:2015 implementation related activities, whether or not this has a direct bearing on environmental performance could be interesting to note as it could potentially be a key factor in the improvement of performance environmentally.

It could also be of interest to conduct a comparative analysis critically quantifying the potential increase in investor inputs within ISO 14001:2015 certified organizations, this study showed that it was the perspective of SHERQ managers in the Durban region that investor inputs were increased through the adoption of ISO 14001:2015, the analysis and quantification of this opportunity would be of interest to organizations potentially considering implementation of ISO 14001. A limitation to this research was the limited period over which it was

undertaken, a future study of this nature over a more substantial period could show evidence of varying ISO 14001 implementation perspectives in accordance to organizations financial years.

This study highlighted the SHERQ managerial perspectives of the risks and opportunities of ISO 14001:2015 adoption in Durban, the findings of this research can potentially be utilized by SHERQ practitioners, SHERQ managers and various employees aligned with the integration of ISO 14001 in order to undertake better informed decision-making regarding implementation from a managerial standpoint. To conclude, it is recommended for a study of this nature to be done within various industries within the province of KwaZulu-Natal, and in South Africa at large in order to ascertain the industry specific trends aligned with the opportunities and risks in the implantation of ISO 14001:2015.

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Annexure A: Covering Letter of Questionnaire

Understanding SHERQ managerial perspectives of the risks and opportunities in ISO 14001:2015 implementation in Durban, KwaZulu-Natal.

I am currently a master's candidate in MSc Environmental Management at the University of South Africa under the supervision of Professor Jan-Albert Wessels.The implementation of environmental management standard ISO 14001:2015 presents many opportunities as well as risks to the organizations which adopt the standard. This study examines these risks and opportunities in the implementation of the standard. The identification of these risks in order to address them and identification of opportunities in order to maximize them can potentially aid in the streamlining of the standards implementation in the Durban region.

Objectives:

1. To identify ISO 14001 implementation opportunities and risks internationally and nationally by means of an extensive review of international as well as national literature sources

2. To generate an evaluation framework to assess SHERQ managerial perspectives of risks and opportunities of ISO 14001:2015 implementation within Durban.

3. To analyse SHERQ managerial responses to the ISO 14001:2015 implementation risks and opportunities within the Durban region.

Your inputs are much appreciated and I thank you for your time and effort in completing the questionnaire.

Yours sincerely

Laurika Harilal

harilallaurika@gmail.com

Master of Science (Environmental Management) Candidate

University of South Africa

Annexure B: Example of Survey Questionnaire

Part 1

Demographic Data of Respondents

Which department do you work in at the organization you are employed at?

What is the duration of your employment in the aforementioned department?

Approximately how much of your working time do you spend directly on ISO 14001 related activities?

None of my working time ☐ Up to 25% ☐ Between 25 and 50% ☐ Between 50 and 75% ☐ Between 75 and 100% ☐ 100% ☐

Have you received any competency training on the ISO 14001:2015 standard from the organization you are employed at?

Yes ☐ No ☐

Part 2: Risks and Opportunities of ISO 14001:2005 implementation

Section A

To what extent do you agree or disagree with the following statements regarding the implementation of the ISO 14001:2015 standard?

1. The increase in leadership responsibilities regarding ISO 14001 implementation at an organization results in increased top management involvement.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

2. An ISO 14001:2015 certified organization meets community and public expectations regarding environmental performance.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

3. There are increased investor inputs since ISO 14001 implementation.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

4. Top management implement proactive environmental measures at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

5. Employees are better committed to environmental sustainability at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

6. Environmental concepts such as pollution prevention are widely communicated among operations at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

7. Employees have clarity regarding all operations as well as their potential improvements at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

8. Targets are more clearly delineated at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

9. Continuous improvement projects are taking place at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

10. There is increased clarity of operational mechanisms at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

11. Environmental Management system is regarded as preventative action

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

12. The Life cycle of goods manufactured at at ISO 14001:2015 certified organizations are taken into consideration in ISO 14001:2015 implementation.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

13. Through the implementation of ISO 14001 company resources are better managed.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

14. Customer satisfaction is improved through ISO 14001: 2015 implementation.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

15. Financial savings are evident through the implementation of ISO 14001.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

Section B

1. You, as a member of SHERQ management were not motivated to be a part of the implementation the ISO 14001 standard due to administrative requirements.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

2. You lacked understanding of the requirements to comply with ISO 14001:2015 at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

3. Compliance to the ISO 14001 standard is a financial burden to ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

4. There is a lack of top managerial involvement in the implementation of ISO 14001:2015 at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

5. The ISO 14001 certification is primarily for the upgrading of public image and there are no improvements in environmental performance

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

6. There is no consideration of environmental policy in production at at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

7. There are increased costs relating to competency training at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

8. Large amounts of time is required for training required for competency regarding ISO 14001 implementation.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

9. There is a lack of cooperation from colleagues at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

10. Product procurement is impacted on placing uncertified suppliers at a disadvantage

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

11. Time designated to the management of ISO integration complexity is limited.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

12. There is a top-down approach with no input utilized from employees regarding ISO 14001 implementation.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

13. Maintenance costs of compliance to the standard are high.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

14. External stakeholder engagement does not occur at ISO 14001:2015 certified organizations.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

15. Identified positive opportunities of ISO 14001 are not effectively utilized.

Strongly agree☐ Agree☐ Partly agree☐ Partly disagree☐ Disagree☐ Strongly disagree☐ Unable to judge☐

Part 3

Additional Comments

_____

Annexure C: Summation of Survey Responses

Section A

Statement	Respondents Feedback	Risks and Opportunities Identified
The increase in leadership responsibilities regarding ISO 14001 implementation results in increased top management involvement	52.4 % of all surveyed respondents strongly agreed with the statement.	Opportunity
The company you are employed by meets community and public expectations regarding environmental performance	47.6% strongly agreed and 35.7% agreed with the statement.	Opportunity
There are increased investor inputs	38.1% agreed and 19% strongly agreed with the view.	Opportunity
Top management implement proactive environmental measures	38.1% strongly agreed and 35.7% agreed with the statement.	Opportunity
Employees are better committed to environmental sustainability	59.5% were agreeable to the statement.	Opportunity

Environmental concepts such as pollution prevention are widely communicated among operations	84% of respondents agreed and strongly agreed with the statement.	Opportunity
Employees have clarity regarding all operations as well as their potential improvements.	38.1% agreed with the statement while 28.6% and another 28.6% partially agreed and strongly agreed respectively.	Opportunity
Targets are more clearly delineated.	71.4% of all survey respondents either agree or strongly agree with the statement.	Opportunity
Continuous improvement projects are taking place	83.3% of all respondents either agreed or strongly agreed with the statement.	Opportunity
Increased clarity of operational mechanisms is evident	66.7% of all survey respondents agree and strongly agree with the statement.	Opportunity
Environmental Management systems are regarded as preventative action	19% strongly agreed and 59.5% agreed with the statement.	Opportunity
The Life cycle of goods manufactured are taken into consideration	33.3% strongly agreed while 35.7% agreed with the statement.	Opportunity
Through the implementation of ISO 14001 company	76.2% of questionnaire respondents either agree or	Opportunity

resources are better managed	strongly agree with the statement.	
Customer satisfaction is improved	81% of respondents either agree or strongly agree with the statement.	Opportunity
Financial savings are evident through the implementation of ISO 14001	31% of the respondents strongly agree, 26.2% agreed with the statement.	Opportunity

Section B

Statement	**Respondents Feedback**	**Risks and Opportunities Identified**
You are not motivated to be a part of the implementation of the ISO 14001 standard due to administrative requirements.	52.4% of all survey respondents either disagree or strongly disagree with the statement.	Opportunity
You lack understanding of the requirements to comply with ISO 14001:2015	71.5%strongly disagree and disagree with the statement.	Opportunity
Compliance to the ISO 14001 is a financial burden.	26.2% strongly disagreed and another 19% of respondents disagreed with the statement, on average respondents did not agree with the statement	Opportunity

There is a lack of managerial involvement in the implementation of ISO 14001	57.1% of respondents either partly disagree, strongly disagree or disagree with the statement.	Opportunity
The certification is for the upgrading of public image and there are no significant improvements in environmental performance	62% of respondents either strongly disagree or disagree with the statement.	Opportunity
There is no consideration of environmental policy in production	73.9% of all respondents either disagree or strongly disagree with the statement.	Opportunity
Increased costs relating to competency training are present.	59.5% of all participants either partly agree, strongly agree or agree with the statement.	Risk
Large amounts of time is required for training required for competency regarding ISO 14001	50% of all surveyed respondents agree, partly agreed or strongly agreed with the statement.	Risk
There is a lack of cooperation from colleagues	50% of survey participants either partly agree, agree or strongly agree with the statement.	Risk
Product procurement is impacted on placing	62% of all survey respondents either agreed,	Risk

uncertified suppliers at a disadvantage	partly agreed or strongly agreed with the statement.	
Time designated to the management of ISO integration complexity is limited	23.8% partly agreed and 35.7% agreed with the statement, on average the sample agreed.	Risk
There is a top-down approach without input utilized from employees regarding ISO 14001 implementation	21.4% agreed and another 21.4% partly agreed with the statement, on average the sample partly agreed with the statement	Risk
Maintenance costs of compliance to the standard are high	57.2% of all respondents either strongly agree, agree or partly agree with the statement.	Risk
External stakeholder engagement does not occur	54.7% of respondents either disagree or strongly disagree with the statement.	Opportunity
Identified positive opportunities of ISO 14001 are not effectively utilized	54.8% of respondents either disagree or strongly disagree with the statement.	Opportunity

Annexure D: Ethics Clearance Certificate

UNISA university of south africa

UNISA-CAES HEALTH RESEARCH ETHICS COMMITTEE

Date: 26/10/2020

Dear Ms Harilal

NHREC Registration # : REC-170616-051
REC Reference # : 2019/CAES_HREC/185
Name : Ms L Harilal
Student #: 60863722

Decision: Ethics Approval of Amendment

Researcher(s): Ms L Harilal
harilallaurika@gmail.com

Supervisor (s): Prof JA Wessels
wessej@unisa.ac.za; 011-471-2084

Working title of research:

Understanding SHERQ Managerial perspectives of the risks and opportunities in ISO 14001:2015 implementation in Durban, KwaZulu-Natal

Qualification: MSc Environmental Management

Thank you for the submission of your amendment request to the UNISA-CAES Health Research Ethics Committee for the above mentioned research. The following amendments are approved:

- Change in scope of the study to the Durban region.
- Change in targeted participants from Tongaat Hulett employees to SHERQ managers within the Durban region.

Please note the following concerns of the committee:

- The committee is of the opinion that these amendments constitute a major change to the initial approved project, and under normal circumstances would require the amended research proposal to be evaluated by the academic department once more. However, the committee notes the concern from the supervisor that the evaluation process in the department under current lockdown conditions will delay the student considerably, and furthermore is satisfied that all ethical concerns have been

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addressed, and therefore waivers this requirement. This is an exception and should not be seen as a precedent for future amendments that constitute a major change to a project.

- It is the supervisor's responsibility to ensure that the project will adhere to the academic standards required by the department.

Ethics approval is granted until the completion of the project, **subject to submission of yearly progress reports. Failure to submit the progress report will lead to withdrawal of the ethics clearance until the report has been submitted.**

Due date for progress report: 30 November 2021

*The **medium risk application** was **reviewed** by the UNISA-CAES Health Research Ethics Committee on 23 October 2020 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Committee.
4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

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7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
8. No field work activities may continue after the expiry date. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:
*The reference number **2019/CAES_HREC/185** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Prof MA Antwi
Chair of UNISA-CAES Health REC
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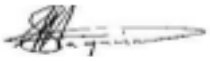

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